

7.0 BACKGROUND AND RI RESULTS FOR CERCLA SITE 19 YARD D-13 (HAZARDOUS WASTE STORAGE YARD)

Section 7.0 includes a comprehensive site summary and analysis of contamination located at CERCLA Site 19. The physical features and history of the site are presented in Section 7.1. The investigation history is presented in Section 7.2, and the initial data evaluation, which includes the site-specific conceptual site model, data quality assessment, and background evaluation, are presented in Section 7.3. The nature and extent evaluation is presented in Section 7.4, and the fate and transport analysis is included in Section 7.5. The HHRA and ERA are summarized in Sections 7.6 and 7.7, respectively. Conclusions and recommendations for Site 19 are identified in Section 7.8.

7.1 PHYSICAL FEATURES AND SITE HISTORY

This section summarizes the physical features, history, and activities at Site 19. The physical features of Site 19 are summarized in Section 7.1.1. The history and activities conducted at Site 19, including generation of hazardous wastes and past disposal and storage practices associated with these wastes, are described in Section 7.1.2. The Site 19 regulatory history is provided in Section 7.1.3.

7.1.1 Site 19 Physical Features

Site 19 is located approximately 1,000 feet east of the Seaplane Lagoon, in the northwest corner of OU-2A (see Figure 1-2). Site 19 is approximately 2.3 acres in size. The main structure at the site is Yard D-13 (also known as RCRA site HW-07), a hazardous waste storage yard. Other site features include Building 616, former Building 609, a closed-in-place underground fuel line, and Navy-installed USTs 616-1 and 616-2 (also known as AOC 616) (see Figure 7-1). No ASTs, washdown areas, or OWSs were identified at Site 19. Approximately 50 percent of Site 19 consists of paved open space.

Two storm sewer lines are located in the vicinity of Site 19. An 18-inch diameter, paved invert corrugated (PIC) iron pipe parallels the western border of Site 19 beneath Orion Street. A 24-inch-diameter PIC line crosses the eastern side of Site 19 from north to south and connects to the storm sewer line beneath West Pacific Avenue.

7.1.2 Site 19 History

The area known as Site 19 was on this historic shoreline of Alameda Island. The eastern portion of Site 19 was onshore, and the western portion was part of the Bay before the Navy took possession of NAS Alameda. The area was filled between 1942 and 1946 by dredging sand from the floor of the Bay and pumping it onto the area.

From the late 1940s to 1975, Site 19 was used for material storage (IT 2001). Aerial photographs from 1949, 1953, and 1969 show unidentified objects of various sizes, most likely crates and equipment, being stored at Site 19 in varying configurations.

In 1975, former Building 609 was built to store engine parts (IT 2001). Various articles can be seen stored around this 11,000-ft² facility in an aerial photograph from 1979. No other details about the construction or use of this facility are available (IT 2001). The building was demolished in 1991.

In 1982, Building 616 was constructed to provide office and storage space. It originally served as a hazardous materials storage area. The building has a concrete floor, wood framing, drywall panels, and corrugated metal roofing and is about 1,800 ft² in size (IT 2001). Two USTs, 616-1 (5,000-gallon capacity) and 616-2 (10,000-gallon capacity), were installed at the same time as the building and were used for spill control, functioning as emergency overflow tanks for fire control. The tanks were never used and are not believed to have ever contained hazardous waste materials (see Figure 7-1). The tanks were identified in the RFA as AOC 616. Both tanks were closed in place in 1987 (Tetra Tech 2003b). The Navy recommends NFA for AOC 616 in Appendix G of this report.

In 1984, a larger hazardous waste storage area (Yard D-13) was built that covered approximately 25,000 ft². It is a concrete area with built-in berms around individual containment areas (see Figure 7-2). A steel roof was added later at an unknown date. Yard D-13 was used as a RCRA-permitted storage area for containers of hazardous wastes generated by Alameda Point activities. Empty 55-gallon drums and drums containing wastes such as corrosives, halogenated and nonhalogenated organic compounds, paints, metals, asbestos, PCBs, petroleum products, and various types of fuel were stored at Yard D-13. Drums containing wastes were organized by chemical type and stored in separate bermed areas in the open-sided building (see Figure 7-2). The wastes were removed from the storage area in 1996. The table below documents the materials and quantity of materials spilled in Yard D-13 (IT 2001). No spills were reported to enter the secondary containment overflow system.

Documented Spills at Yard D-13		
Date	Material	Quantity
1989	Nitric Acid	50 gallons
January 12, 1990	Zyglow penetrant	Unknown
June 28, 1990	Poly paint	8-10 gallons
July 19, 1990	PD-680	10 gallons
August 28, 1990	Oil and fuel	250 gallons

In 1996, Building 616 and Yard D-13 ceased operating as hazardous waste storage facilities and received RCRA closure in 1999 (DTSC 1999b).

Currently, Yard D-13 is leased to Foss Environmental for use as an equipment and materials storage yard. Foss Environmental conducts some vehicle maintenance at Site 19 but primarily uses the property as a staging ground for environmental response activities.

7.1.3 Site 19 Regulatory History

Several facilities and areas within Site 19 are regulated by different programs. These programs include CERCLA, TPH, and RCRA. This section briefly describes each program at Site 19.

7.1.3.1 CERCLA Program

Site 19 was suspected of being part of the former oil refinery property discussed in Section 6.0, and DTSC requested that the Navy investigate the oil refinery. In 1990, the Navy added Site 19 to the CERCLA program by including it in the RI/FS work plan (Canonie 1989, 1990). The work plan discussed collecting samples for analysis of TPH associated with the refinery and to evaluate whether releases from the hazardous waste storage facility had occurred.

7.1.3.2 RCRA Program

Yard D-13 at Site 19 was used to manage RCRA hazardous wastes. The RFA also identified AOC 616 at Site 19.

Yard D-13/HW-07 (Yard D-13) was a RCRA Part B-permitted site located in the south-central portion of Site 19. Yard D-13 was used to store waste for more than 90 days. On March 4, 1998, the Navy provided a closure certification report for the RCRA-permitted facility, and DTSC accepted the site closure certification in a letter dated July 21, 1999 (DTSC 1999b). Yard D-13 and Building 616 were referred to as SWMU/Unknown in the RFA; these two units were closed together (DTSC 1999b).

AOC 616 refers to two steel USTs installed north of Building 616 in CAA-4B at Site 19. The USTs, 616-1 (5,000-gallon capacity) and 616-2 (10,000-gallon capacity), were installed at the same time as the building and were used for spill control, functioning as emergency overflow tanks for fire control. The tanks were never used and are not believed to have ever contained hazardous waste materials. Both tanks were closed in place in 1987 (Tetra Tech 2003b). The Navy recommends NFA for AOC 616 in Appendix G of this report.

7.1.3.3 TPH Program

After Alameda Point was identified for closure in September 1993, the TPH program was implemented to decommission all USTs and other fuel-related items. As part of the program, TPH contamination was evaluated at 22 CAAs and 3 fuel line-specific CAAs. Several investigations have occurred under the TPH program, which are summarized in Section 7.2.4. The northwestern portion of Site 19 is included in the southern portion of CAA-4B (see Figure 7-1).

7.2

SITE 19 ENVIRONMENTAL INVESTIGATIONS

This section describes the environmental investigations conducted at Site 19, which include investigations conducted before the IRP, under CERCLA, under the EBS and TPH Programs, and during removal actions.

Tables 7-1 and 7-2 summarize the soil and groundwater samples collected by the environmental investigations conducted at Site 19 and the types of analyses conducted. Sampling locations are shown on Figure 7-3 and are categorized by the investigation. Results for each investigation are presented in Tables 7-3 through 7-10. The tables are organized by analytical group and detail the number and percent of detections; the minimum, average, and maximum detected concentration; the minimum and maximum detection limit; the number of detections exceeding either the residential (for soil) or tap water (for groundwater) PRGs (EPA 2002a); the number of detection limits for nondetected samples exceeding the PRG; and the PRG.

The following subsections summarize investigations conducted at Site 19 prior to the IRP (Section 7.2.1), under the CERCLA (Section 7.2.2), EBS (Section 7.2.3), and TPH programs (Section 7.2.4), and as a part of removal actions and treatability studies (Sections 7.2.5 and 7.2.6, respectively).

7.2.1 Investigations Conducted Before the IRP

In 1982, the Navy initiated the NACIP to identify, assess, and control contamination of the environment resulting from base activities. The IAS completed in 1983 (E&E 1983) identified several areas for additional investigation. In addition, information from several active portions of NAS Alameda was documented in the IAS report. These findings provide much of the operational and historical information presented in this document and set the stage for much of the Navy's subsequent investigations at Alameda Point. The IAS report discusses activities conducted at NAS Alameda and identifies the former oil refinery as a potential concern. The Navy began investigation activities at Site 19 to evaluate whether the property had been part of the former oil refinery identified by DTSC in 1988 (DTSC 1988).

7.2.2 CERCLA Investigations

The following subsections summarize investigations conducted at Site 19 under CERCLA. These investigations include the Phase 1 and 2A investigation performed in 1991, the follow-on investigations conducted in 1994 and 1998, the storm sewer investigation in 2000, the supplemental RI data gap sampling performed in 2001, the basewide groundwater monitoring conducted in 2002 and 2003, and the basewide PAH study in 2003.

Boring logs for all investigations are presented in Appendix B.

7.2.2.1 Phase 1 and 2A Investigation, 1991

The Navy contracted with Canonie to determine if contamination from surface spills or leaks within Yard D-13 or waste from the former refinery had impacted soil and groundwater at Site 19 (Canonie 1989).

Soil

The 1991 investigation included drilling 16 soil borings (BD13-1 through BD13-16) and installing four monitoring wells at four of the boring locations (MWD13-1 through MWD13-4 at BD13-1 through BD13-4) (see Figure 7-3). To evaluate if contaminants were present in the areas investigated, 174 soil samples were collected and analyzed for VOCs, SVOCs, pesticide and PCBs, metals, TRPH, TOC, cations/anions and pH, cyanide, and general chemistry characteristics. The table below summarizes the chemicals detected at concentrations exceeding the residential PRG (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 19 1991 Phase 1 and 2A Investigation Soil Summary		
Analytical Group	Detected Compounds Exceeding 2002 Residential PRG	Location of Highest Concentration
VOCs	None	Not Applicable
SVOCs	Benzo(a)pyrene and benzo(b)fluoranthene	BD13-9 BD13-16
Pesticides and PCBs	None	Not Applicable
Metals	Arsenic	BD13-8
	Iron	BD13-7
	Lead	BD13-16

Note:

PAH data collected for soil during this investigation were not used in this RI because of high detection limits; data from additional PAH sampling conducted in 2003 were used.

No VOCs, PCBs, petroleum hydrocarbons, or pesticides were detected in soil at concentrations exceeding their respective residential PRGs (EPA 2002a).

No SVOCs were detected in soil at concentrations exceeding their respective residential PRGs (EPA 2002a). PAHs were detected at concentrations exceeding 2002 residential PRGs in the SVOC analytical run in borings BD13-9 (8.5 to 9.0 feet bgs) and BD13-16 (13.5 to 14.0 feet bgs). It was noted in the investigation report that several borings had PAH compounds detected in the saturated zone (beneath approximately 6 feet bgs) (PRC and JMM 1992).

Arsenic (in samples from BD13-8, BD13-11, BD13-13, BD13-15, BD13-16, MWD13-1, MWD13-2, and MWD13-3), iron (in samples from BD13-7 and MWD13-2), and lead (in samples from BD13-13 and BD13-16) concentrations exceeded 2002 residential PRGs (EPA 2002a).

Groundwater

Four of the 16 soil borings were completed as monitoring wells: two in the southern portion of the yard near Yard D-13, one in the northern portion of Site 19, and one west of Building 616. Four groundwater samples were collected, one from each monitoring well, and analyzed for VOCs, SVOCs, pesticides and PCBs, metals, TRPH, TOC, cyanide, and cations/anions. The table below summarizes the chemicals detected at concentrations exceeding tap water PRGs (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 19 1991 Phase 1 and 2A Investigation Groundwater Summary		
Analytical Group	Detected Compounds Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOC	1,1-DCA	MWD13-1
SVOC	None	Not Applicable
Metals	Arsenic	MWD13-1
	Barium, iron, manganese, nickel, and vanadium	MWD13-4

VOCs, pesticides, and metals were all detected in groundwater samples collected from Site 19. Various metals that exceeded the 95 percent/95 percent statistical tolerance level for background were also detected in groundwater (PRC and JMM 1992). Arsenic, barium, iron, manganese, nickel, and vanadium were detected at concentrations exceeding 2002 tap water PRGs (EPA 2002a).

Analytical detection limits of numerous VOCs, SVOCs, and metals in soil and groundwater, exceeded 2002 tap water PRGs (EPA 2002a). Furthermore, QA/QC information was not available for data validation at the time of the investigation report was prepared. Groundwater and soil data were used only for qualitative purposes in the investigation report (PRC and JMM 1992), but the Navy and agencies deemed the data acceptable for inclusion in the risk assessments.

Recommendations for future work included collecting additional soil samples to evaluate the extent of SVOCs and VOCs in the northwest corner of Site 19 and to characterize petroleum hydrocarbons detected in surface soils. Recommendations also were made for the collection of additional groundwater samples to evaluate tidal influence on the shallow and deeper water-bearing zones; to verify that groundwater has not been impacted by VOCs, SVOCs, and petroleum hydrocarbons; to better characterize metals in groundwater; and to evaluate whether groundwater beneath Site 19 was considered a potential drinking water source.

The investigation report concluded that based on the samples collected, sufficient metals data were collected in soil for the RI/FS and that VOCs, SVOCs, and petroleum compounds detected at Site 19 would be addressed during the risk assessments (PRC and JMM 1992).

7.2.2.2 Follow-On Investigation, 1994

Based on the recommendations of the 1991 investigation and discussions with the regulatory agencies, a follow-on investigation was conducted to provide additional lithologic, chemical, and hydrogeologic information to help assess the nature and extent of soil and groundwater contamination for the RI/FS (PRC and JMM 1994). Analytical results from previous investigations indicated the presence of VOCs, SVOCs, pesticides, metals, and petroleum hydrocarbons above the background concentrations at several locations at Site 19. Activities conducted under the follow-on investigation consisted of soil sampling, nonpoint sampling (sediment in storm drain catch basins), CPT and direct-push groundwater sampling, well installation, and four quarters of groundwater monitoring (PRC and MW 1996). Sampling locations are presented on Figure 7-3.

Soil

Twelve soil samples were collected from four borings (B19-17, B19-18, B19-19, and M19-05). One boring was completed as a monitoring well. Soil sampling and monitoring well installation was performed to confirm previously reported VOC concentrations in near-surface soils and to evaluate the lateral extent of VOC concentrations detected in monitoring well MWD13-2. The table below summarizes the chemicals detected at concentrations exceeding the residential PRG (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 19 1994 Follow-On Investigation Soil Summary		
Analytical Group	Detected Compounds Exceeding 2002 Residential PRG	Location of Highest Concentration
VOC	None	Not Applicable
SVOCs	Benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene	B19-17
	Benzo(a)pyrene,	B19-18
Metals (Cyanide only)	None	Not Applicable

Note:

PAH data collected for soil during this investigation were not used in this RI because of high detection limits; data from additional PAH sampling conducted in 2003 were used.

No VOCs or cyanide were detected in soil at concentrations exceeding their respective residential PRGs (EPA 2002a). SVOCs were detected in soil samples collected during this investigation. PAHs were detected at concentrations exceeding the 2002 residential PRG in samples from borings B19-17 (1 to 2 feet bgs) and B19-18 (4.5 to 5.5 feet bgs).

Groundwater

Direct-push groundwater sampling was performed at five locations to evaluate the lithologic and hydrogeologic characteristics below a depth of 15 feet and to identify the SWBZ. Hydropunch groundwater sampling was conducted adjacent to the CPT locations. Four of the sampling locations (DHP-S19-01 through DHP-S19-04) were at the edges of Site 19, and one location (DHP-S19-05) was southwest of MWD13-2; these locations were sampled in shallow groundwater for analysis of VOCs, TRPH, and oil and grease to assess the extent of contamination. Three locations (SHP-S19-01 through SHP-S19-03) were sampled in shallow groundwater for analysis of petroleum hydrocarbons to assess the extent of contamination north and east of Yard D13. Figure 7-3 shows the sample locations.

One shallow monitoring well, M19-05, was installed in the central part of the site to evaluate the presence of petroleum hydrocarbons in groundwater and to further characterize groundwater flow directions and gradients in the FWBZ. Based on detected concentrations from Hydropunch samples, one deep monitoring well (D19-01) was installed immediately west of Building 616. These two wells, along with the four existing wells, were sampled on a quarterly basis as part of this investigation (PRC and MW 1996). The table below summarizes the chemicals detected at concentrations exceeding tap water PRGs (EPA 2002a) and the sampling location with highest detected concentration for each chemical.

Site 19 1994 Follow-On Investigation Groundwater Summary		
Analytical Group	Detected Compounds Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOC	1,1-DCA and TCE	DHP-S19-02
	1,2-DCA	DHP-S19-04
	Benzene and PCE	MWD13-4
SVOCs	Bis(2-ethylhexyl)phthalate	MWD13-3
Metals	Arsenic	MWD13-1
	Manganese	D19-01
	Thallium	MWD13-3

VOCs, SVOCs, and metals were detected in groundwater samples collected during the 1994 follow-on investigation at concentrations exceeding 2002 residential PRGs (EPA 2002a). Arsenic, manganese, and thallium were detected at concentrations exceeding the 2002 tap water PRGs (EPA 2002a).

Analytical detection limits of numerous VOC, SVOC, and metals in soil and groundwater exceeded the 2002 tap water PRGs (EPA 2002a).

Nonpoint source samples

Two sediment samples were collected from a storm drain catch basin (4-J-1C) south of Site 19 to evaluate whether nonpoint sources were discharging into the drainage system. Figure 7-3 shows the sampling locations, and Table 7-1 for a lists the analyses conducted.

Based on the data collected, it was determined that chemicals detected during this investigation were similar in nature to those found during previous investigations. The extent of chemicals appeared to be adequately characterized; however, the report recommended additional sampling to evaluate if a human health or environmental risk was defined during the risk assessment (PRC and MW 1995).

7.2.2.3 Follow-On Investigation, 1998

The 1998 follow-on investigation consisted of basewide quarterly groundwater monitoring to assess and monitor the extent of plumes on various sites at Alameda Point (U&A 1998). One well (MWD13-3) within Site 19 was originally included in the monitoring program to assess the migration of a petroleum hydrocarbon plume at adjacent Site 13, which borders Site 19 along its western and southern borders. Two more wells (D19-01 and MWD13-2) were sampled during the third and fourth quarters. Groundwater samples collected from these wells were analyzed for VOCs; metals; TPH-g, TPH-d, and TPH-mo; and general groundwater chemistry (Tetra Tech and U&A 1998). Data from the latter two analyses were used in the basewide analysis of ambient water quality (Tetra Tech 1998) and in the evaluation of beneficial uses of groundwater (Tetra Tech 2000a). Samples from the first quarter of groundwater monitoring were also analyzed for TOC to help evaluate the biodegradation potential for petroleum hydrocarbons. Sampling locations are presented on Figure 7-3. The table below summarizes the chemicals detected at concentrations greater exceeding tap water PRGs (EPA 2002a) and the sampling locations with the highest detected concentration for each chemical.

Site 19 1998 Follow-On Investigation Groundwater Summary		
Analytical Group	Detected Compounds Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOC	1,1-DCA	MWD13-3
Metals	Arsenic	MWD13-3
	Manganese	D19-01

1,1-DCA was detected in samples from two wells, MWD13-2 and MWD13-3. Groundwater samples from monitoring well MWD13-3 exhibited 1,1-DCA at concentrations above the reporting limit and above the tap water PRG (EPA 2002a) during all four quarters. 1,1-DCA was detected above the reporting limit (but below the PRG) in one sample from MWD13-2. Various unfiltered and filtered metals were detected above reporting limits in groundwater samples collected, but arsenic and manganese were detected at concentrations above tap water PRGs (EPA 2002a). TPH compounds were detected in three wells, D19-01, MWD13-2, and MWD13-3.

7.2.2.4 Storm Sewer Investigation, 2000

The basewide storm sewer investigation evaluated the physical conditions of storm sewers and the places where storm sewers are submerged below groundwater; identified locations where contaminated groundwater intercept submerged, damaged sections of storm sewers; and identified significant data gaps for further evaluation.

The storm sewer line (sewer line 4J) that runs north to south across the western portion of Site 19 was determined to be in sound condition between Site 4 to the north and Site 13 to the south. It is unknown whether or not it is submerged. The storm sewer line (sewer line 5J) that runs north to south across the eastern portion of Site 19 was determined to be overall in sound condition between Site 4 to the north and Site 13 to the south, although infiltration was observed during the storm sewer survey at a section of line near the southern border of Site 19 (Tetra Tech 2000b). No further study was recommended for these lines at Site 19 (Tetra Tech 2000b).

7.2.2.5 Supplemental Data Gaps Investigation, 2001

The supplemental data gaps investigation at OU-2A addressed two primary data gap categories: (1) monitor the status of groundwater contaminant plumes and (2) evaluate preferential flow paths associated with the storm sewer system (Tetra Tech 2002a). This investigation included sampling of groundwater monitoring wells but did not include sampling of bedding material at the storm sewers.

Groundwater samples were collected from the six monitoring wells at Site 19 to establish current site conditions, identify point-of-compliance wells for long-term monitoring, and approximate exposure areas for the risk assessment (Tetra Tech 2002a). Water level elevations also were collected to provide local conditions of groundwater flow. Groundwater samples from the wells at Site 19 were analyzed for PAHs using a separate analytical method capable of attaining lower detection limits during this investigation. The table below summarizes the chemicals detected at concentrations exceeding tap water PRGs (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 19 2001 Supplemental Data Gaps Sampling Investigation		
Analytical Group	Detected Compounds Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOC	1,1-DCA, PCE, and TCE	MWD13-4
	1,2-DCP	M19-05
SVOCs	None	Not Applicable
PAHs	None	Not Applicable

VOCs, TPH, and PAHs were detected in the groundwater samples collected during the data gaps investigation. VOCs were detected in samples from five wells (MWD13-1 through MWD13-4

and M19-05). PAHs were detected in five wells, and naphthalene was present at the highest concentration. TPH was detected in three wells.

VOCs were detected in groundwater at concentrations exceeding their respective tap water PRGs (EPA 2002a) in samples from monitoring wells MWD13-4 and M19-05. VOCs were detected at concentrations exceeding MCLs in a sample from monitoring well MWD13-4.

No SVOCs or PAHs were detected in groundwater at concentrations exceeding their respective residential PRGs (EPA 2002a) or MCLs.

The data gaps sampling investigation defined the horizontal and vertical extent of chlorinated hydrocarbons in groundwater west of Building 410. Sampling was conducted in accordance with the FSP and accompanying QAPP and project-specific DQOs (Tetra Tech 2001a). Analytical detection limits were established based on MCLs and not 2002 residential PRGs.

7.2.2.6 Basewide Groundwater Monitoring, 2002 and 2003

The specific objectives of the basewide groundwater monitoring investigation were to (1) evaluate contaminant plumes in groundwater and (2) determine the main chemicals of concern (Shaw 2003a). The monitoring scheme for OU-2A included 23 of the 46 wells located within the five sites of OU-2A (Sites 9, 13, 19, 22, and 23). Two wells at Site 19 (MWD13-3 and D19-01) were sampled during the first and third quarterly events, between June 19 and July 12, 2002, and in December 2002, respectively. One well (MWD13-4) was sampled for four quarters (June, September, and December 2002 and April 2003). Samples were analyzed for chlorinated VOCs, benzene, dissolved metals, TPH-E, and TPH-P (IT 2002).

Sampling locations are presented on Figure 7-3. The table below summarizes chemicals detected at concentrations exceeding the tap water PRG and sampling locations with the highest detected result for each chemical.

Site 19 2002/2003 Basewide Groundwater Monitoring Investigation		
Analytical Group	Detected Compounds Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOC	1,1-DCA, PCE, and TCE	MWD13-4
Metals	Arsenic and manganese	D19-01

VOCs, TPH, and metals were detected in groundwater samples collected during this investigation. TPH-P was detected in two wells, MWD13-3 and D19-01, and TPH-E was detected in samples from one well, MWD13-3. VOCs were detected in samples from two wells, MWD13-3 and MWD13-4. Low concentrations of 18 different VOCs were detected.

VOCs were detected at concentrations exceeding their respective PRGs and MCLs in samples from monitoring well MWD13-4. Arsenic and manganese were detected at concentrations exceeding their respective tap water PRGs in samples from monitoring well D19-01.

7.2.2.7 Basewide PAH Study, 2003

The primary objectives of the PAH study was to collect sufficient PAH data to calculate EPCs for risk assessments at CERCLA sites (Bechtel 2003). The historical PAH data collected at each CERCLA site were used to estimate the mean and standard deviation of BaP concentrations to determine the appropriate number of PAH samples to collect at each site. At Site 19, 13 soil borings were advanced across the site using direct-push sampling methods. Samples were collected from each of the following four depth intervals: 0 to 0.5, 0.5 to 2, 2 to 4, and 4 to 8 feet bgs. Sampling locations are shown on Figure 7-3. Boring logs are presented in Appendix B. Table 7-10 provides a statistical summary.

PAHs were detected at concentrations exceeding the Alameda Point action level of 0.62 mg/kg in 1 of the 52 samples collected at Site 19 (see Figure 7-3). PAHs (quantified as BaP) were detected at a concentration of 0.675 mg/kg at location B0091.

7.2.3 EBS

The EBS was performed to identify the environmental condition of all base property and facilities to help transfer the land to the community as quickly as possible. The EBS was conducted in two phases.

Phase 1. The first phase of the investigation comprised an examination of aerial photographs and historical records as well as the performance of site inspections and interviews with current and former employees involved in operations. The Phase 1 EBS found that many parcels had insufficient information to classify them as transferable; therefore, recommendations for additional investigations for soil and groundwater were prepared and presented in the zone analysis plans and parcel evaluation plans (ERM-West 1995a, 1995b).

Phase 2A. As recommended by the IAS (E&E 1983), the Phase 2A and 2B investigations did not focus on areas already under evaluation. Other Navy land uses or areas that may impact transfer were the subject of the Phase 2A and 2B EBS investigations. Site 19 lies in Zone 22 and comprises Parcel 142 and a section of Subparcel 134A that lies within the site and runs along the western border (Figure 7-1). Soil sampling was conducted in Subparcel 134A from January to April 1995 during the Phase 2A investigation. No sampling was conducted on Parcel 142 (IT 2001).

Subsurface soil sampling conducted in the portion of Subparcel 134A that lies within Site 19 was performed to address the possible release of compounds associated with fuel oil, solvents, and lubricating oil used in Building 372 located north of Site 19 in Site 4. One surface soil sample was collected in Target Area 2 (Zone 22) south of Building 372 at location 134-Z22-025 to

address possible releases within Zone 22. This sample was analyzed for SVOCs, PCBs, metals, TPH-E, and TPH-P (IT 2001). Three locations were sampled (one sample from each location) in the sewer lines: storm sewer 134-SS-003, sanitary sewer 134-SN-003, and industrial waste line 134-IW-005 in Target Area 1 (Building 372), south and downgradient of Building 372 (see Figure 7-3). These samples were analyzed for VOCs, SVOCs, metals, TPH-E, and TPH-E.

One additional industrial waste line sample was collected at location 210-IW-004 but was labeled incorrectly as belonging to Parcel 210 (see Figure 7-3). This sample was analyzed for VOCs, SVOCs, metals, TPH-E, and TPH-P. Results for this sample were reported in the EBS under Parcel 147 Phase 2A investigation (IT 2001). TPH-mo, PCB, and one SVOC were detected at low concentrations in the Zone 22 sample collected within Site 19. PAH and oil and grease were detected at low concentrations in the samples collected from the industrial waste and storm sewer lines. See Appendix E for further information.

Phase 2B. Soil and groundwater sampling was conducted at Subparcel 134A in October 1995 during the Phase 2B EBS investigation. Parcel sampling was conducted during Phase 2B to further address the possible release of compounds associated with Building 372. Two soil samples and one water sample were collected at point 134-006-041 located west of the southwestern corner of Yard D-13 in Target Area 6 (Parcel 134) (see Figure 7-3). These samples were analyzed for VOCs, SVOCs, metals, TPH-E, and TPH-P (IT 2001). Two pesticides and TPH-g were detected at low concentrations in the soil sample collected at a depth of 6 feet bgs. Low-concentration PAHs and VOCs were detected in the grab groundwater sample.

7.2.4 TPH Program

As defined under the Alameda TPH program, the northwestern corner of Site 19 is also part of CAA 4B (see Figure 7-1). CAA 4B was created to address TPH and lead contamination in soil and groundwater in the vicinity of Building 372 and two associated USTs (371-1 and 372-2), all of which are located in Site 4 in OU-2B, to the north of Site 19. Issues associated with CAA 4B will be addressed in the upcoming OU-2B RI report.

In 1995, several monitoring wells were installed to the north of Site 19 to monitor TPH-related chemicals in soil and groundwater at the location of former USTs 372-1 and 372-2. One of these wells (372-MW2) is located within the boundaries of Site 19. Soil samples were collected during the construction of this monitoring well, and groundwater has been sampled several times under the TPH program. Low-level TPH-d, TPH-g, and TPH-jet fuel have been detected in this well several times. One VOC has been detected once, at a low concentration.

7.2.5 Removal Actions

In 1998, a basewide removal action was conducted to address active and inactive fuel lines across Alameda Point (Tetra Tech and R&M 2000). Although no removal was conducted at Site 19, the inactive fuel line running north-south across the western portion of the site (Figure 7-1) was sampled at two locations (030-S19-005 and 030-S19-007) and subsequently

filled with grout as part of the in-place closure. TPH-g was detected at a concentration of 0.05 mg/kg in one sample.

7.2.6 Treatability Studies

No treatability studies were conducted at Site 19 during the RI.

7.3 INITIAL DATA EVALUATION

Based on the investigations described in Section 7.2, the Navy completed an initial data evaluation for Site 19. This evaluation included (1) a site-specific CSM, (2) a data quality assessment, and (3) a background comparison. The complete background comparison is provided in Appendix A.

7.3.1 Site 19 Conceptual Site Model

The initial CSM was refined in an iterative process that involved conducting environmental investigations, identifying areas of known or potential releases of chemicals to the environment, and filling data gaps. This iterative process resulted in a CSM specific to Site 19 and identification of remaining data gaps. This site-specific CSM was used to support the nature and extent evaluations and risk assessments by identifying potential sources of contamination, media affected, exposure pathways, and future receptors. The CSM for Site 19 is described in the following text and presented on Figure 7-5.

Through environmental investigations and literature searches for Site 19, physical features and activities at Site 19 that might have generated hazardous waste or released chemicals to the environment were identified. The following physical features and activities were identified as potential sources of contamination:

- Yard D-13 (RCRA site HW-07) – Hazardous waste storage yard; concrete area with built-in berms around individual containment areas; stored wastes such as corrosives, halogenated and nonhalogenated organic compounds, paints, metals, asbestos, PCBs, petroleum products, and various types of fuel; documented releases during operation included spills of nitric acid, PD-680, poly paint, zyglow penetrant, and mixed oil and fuel; no spills were reported to enter the secondary containment overflow system.
- Building 616 – Constructed for use as office and storage space; served as a hazardous materials storage area until Yard D-13 was built; potentially stored wastes such as corrosives, organic compounds, paints, metals, asbestos, PCBs, petroleum products, and various types of fuel.

- USTs 616-1 and 616-2 (AOC 616) – 5,000 and 10,000-gallon capacity tanks associated with Building 616; installed for spill containment and emergency overflow for fire control; were never used and have an exempt status under RCRA.
- Placement of dredged fill material used to build the island – Potential source of PAHs.

USTs 616-1 and 616-2 and Building 609 are not considered likely sources of contamination. Building 609 was used to store engine parts. USTs 616-1 and 616-2 were closed in place, and no samples were collected from below the tanks. VOCs in soil were evaluated in five samples collected from sampling location BD13-5 located within 25 feet of the USTs. Groundwater was evaluated in monitoring well 372-MW2 located 25 feet downgradient from the USTs. No evidence of CERCLA contamination was observed at these locations.

Of these potential sources, (1) Yard D-13, (2) Building 616, and (3) fill material containing PAHs were identified as likely sources of contaminants in soil and groundwater at Site 19. The exposure pathways and primary and secondary release mechanisms may include the following:

- Direct release of organic compounds, paints, metals, asbestos, PCBs, and petroleum products associated with Yard D-13 to surface soil.
- Direct release of organic compounds, paints, metals, asbestos, PCBs, and petroleum products associated with Building 616 to surface soil.
- Placement of fill material containing PAHs.
- Secondary release from soil to air through volatilization or resuspension of particulates.
- Secondary release from soil into the food chain from plant uptake.
- Secondary release from soil to groundwater through infiltration uptake.
- Secondary release from groundwater to air through volatilization.
- Secondary release from groundwater into domestic use through a well.

As shown in the CSM for Site 19 (see Figure 7-5), residential, commercial/industrial, and construction worker receptors were identified as potential human receptors. Exposure scenarios that include ingestion of homegrown produce and ingestion, dermal contact, and inhalation of soil and groundwater are evaluated in the HHRA (see Appendix H). Exposure of potential ecological receptors to contaminants through direct contact with soil and the food chain were also evaluated in the ERA.

Exposure of potential ecological receptors to groundwater from migration to surface water was considered an incomplete pathway. Groundwater contamination has not migrated to San Francisco Bay, and the storm sewer system at Site 19 is not considered a preferential pathway for contaminant migration to San Francisco Bay. In addition, samples collected from the storm

drain bedding did not contain VOCs at concentrations exceeding detection limits, indicating that the bedding is not serving as a migration pathway.

The storm sewer line (sewer line 4J) that runs north to south across the western portion of Site 19 (see Figure 7-1) was determined to be in sound condition between Site 4 to the north and Site 13 to the south. It is unknown whether or not it is submerged. The storm sewer line (sewer line 5J) that runs north to south across the eastern portion of Site 19 was determined to be in sound condition between Site 4 to the north and Site 13 to the south, although infiltration was observed during the storm sewer survey at a section of line near the southern border of Site 19 (Tetra Tech 2000b). Because data show that the groundwater contamination plumes do not intersect sewer lines 4J and 5J, it is unlikely that the sewer lines will create a preferential migration pathway to San Francisco Bay. Data collected from storm drain manhole 5J-3B indicates that very low concentrations of VOCs are present in storm water. Although data suggest that the groundwater contaminant plumes do not intersect sewer lines 4J and 5J; available data are limited to complete this evaluation.

7.3.2 Site 19 Data Quality Assessment

As discussed in Section 7.2, several environmental investigations were conducted at Site 19 as a part of CERCLA and EBS programs to identify and assess the extent of contamination in soil and groundwater and to determine risk. Data were collected over a period of approximately 13 years from 1990 through 2003 using a biased and phased sampling approach. Sampling focused on the following:

- Industrial, sanitary, and storm sewers
- Refinery waste, surface spills, and leaks within Yard D-13 to determine if soil or groundwater had been impacted
- Confirm the presence of VOCs in near surface soil
- Determine lateral extent of VOCs in groundwater
- Determine extent of TPH and oil and grease in shallow groundwater
- Evaluate fill material and native sediments to assess the presence of PAHs

These data, through an iterative process, were used to construct and refine the site-specific CSM presented in Section 7.3.1 and to identify and fill data gaps until the quantity and quality of the data at Site 19 were judged to be sufficient to complete the RI report, as determined by applying the DQOs presented in Section 3.4.

Detection limits for some of the data used to evaluate Site 19 are elevated over residential PRGs (EPA 2002a); these elevated detection limits are the consequence of one or more of the following circumstances: (1) the evolution of lower detection limits as technology improves, (2) the revision of PRGs over time (which are not always technologically feasible), (3) and matrix interference. The first two of these circumstances generally do not result in significantly

elevated detection limits. However, matrix interferences sometimes cause significant elevations in the detection limits for a chemical contaminant, which leads to uncertainty as to whether that undetected compound could be present in significant concentrations at a site. Although some detection limits (SQL) were elevated above 2002 residential PRGs, detection limits for nondetected chemicals were typically sufficiently low to permit identification of potential health risks. However, detection limits were elevated in both soil and groundwater for some nondetected SVOCs; as a result, further sampling and analysis of soil and groundwater for SVOCs may be needed to confirm these chemicals are not present in soil or groundwater at Site 19.

Although soil and groundwater data gaps were identified, it was determined that the types and numbers of samples collected at the Site 19 (see Figures 7-4A through 7-4L and 7-6 through 7-9) and the analytical suite (see Tables 7-11 and 7-12) were adequate to characterize Site 19 and to conduct risk assessments because data collection at Site 19 focused mainly on potential sources and was conducted in phases. This phased approach afforded stakeholders opportunities to provide feedback on the suitability or adequacy of the data collected and the need for additional data to identify releases and complete the RI report. It is unlikely that a source at Site 19 has not been adequately characterized or that the RI would recommend NFA if the site poses a potential significant risk to human health or the environment.

Both definitive and screening-level data were generated. Screening data were considered appropriate for use only in evaluations of nature and extent and fate and transport of chemicals. Section 3.4.2 provides further detail on the assessment of data quality and the use of definitive and screening-level data.

Data generated during the environmental investigations that were considered to be of sufficient quality for use in the RI report are presented in Appendix E and in the subsections below. Tables 7-14 through 7-15 summarize results of the CERCLA and EBS investigations for soil and groundwater. Soil gas results are presented in Appendix E. The summaries are organized according to analytical group and include the following: (1) the number and percent of detections of chemicals; (2) the average, minimum, and maximum detected concentrations; (3) minimum and maximum detection limits for nondetected samples; and (4) whether the maximum detected concentrations or detection limits exceed Region 9 residential PRGs or Cal-modified PRGs (EPA 2002a). Cal-modified PRGs are used for some chemicals if the California EPA PRG is more protective than the federal EPA value. PRGs and MCLs are provided in the tables for comparison only.

7.3.2.1 Soil

Soil samples collected at Site 19 were analyzed for VOCs, SVOCs, PAHs, pesticides and PCBs, and metals as well as physical parameters (hardness, acidity, pH, anions, specific conductance, total dissolved solids, dissolved gases, sulfides, and biological and chemical oxygen demand) (see Table 7-1). Of the samples collected and analyzed, 97 samples for VOCs, 78 samples for SVOCs, 52 samples from the additional PAH sampling conducted in 2003, 71 samples for pesticides and PCBs, 60 samples for total metals, and 12 samples for cyanide were considered

acceptable for use in this RI report. PAH data for soil samples collected during previous investigations were not evaluated because of the high detection limits associated with the data. Laboratory detection limits for some chemicals exceeded residential PRGs (EPA 2002a) and are noted in Table 7-11. Detection limits for a few of the nondetected pesticides and PCBs were also elevated above residential PRGs (EPA 2002a); however, most of the nondetected samples had detection limits below PRGs. Therefore, detection limits for pesticides and PCBs were sufficiently low to permit identification of a potential health risk. Most of the detection limits for some of the nondetected SVOCs (2-nitroaniline, bis[2-chloroethyl]ether, hexachlorobenzene, and n-nitroso-di-n-propylamine) had detection limits exceeding PRGs. Detection limits for non-detected arsenic and thallium in soil were also elevated above residential PRGs. However, Site 19 was not identified as a source of arsenic or thallium (see Section 7.3.1), and concentrations detected in site soil are similar to concentrations detected in ambient soil.

A subset of these data was selected for use in the risk assessments (see table below). Data were considered to be appropriate for use if they (1) were validated, (2) could be used to characterize CERCLA releases, and (3) reflected current site conditions. Only data collected with the objective of characterizing CERCLA activities were used. Data collected as part of the EBS program are more of a screening nature, and inclusion of these data could add more uncertainty to the risk assessments. Soil samples collected from petroleum-saturated soil were not included in the risk assessments. Petroleum-saturated soil encountered in the center and southeast portions of Site 19 is associated with oil refinery waste, and petroleum-saturated soil encountered around Building 397 is associated with the release of jet fuel. Risk from TPH was assessed separately (see Appendix F).

Data for soil from each site were aggregated in depth intervals of 0 to 2, 0 to 4, and 0 to 8 feet bgs. The depth intervals evaluate potential exposures associated with site use. The 0-to-2-feet and 0-to-8-feet-bgs depth intervals evaluate potential human health exposures, and the 0-to-4-feet-bgs depth interval evaluates potential ecological exposures. The total number of samples for each analytical group included in the data set for each of these depth intervals is presented in the table below.

Number of Suitable Soil Data for Site 19 Risk Assessments			
Analytical Group	(0 to 2 feet bgs)	(0 to 4 feet bgs)	(0 to 8 feet bgs)
VOCs	5	20	38
SVOCs	18	29	42
PAHs	26	39	52
Pesticides and PCBs	14	24	33
Metals	14	24	33

The minimal data for VOCs in soil from 0 to 2 feet bgs are not perceived as a data gap because Site 19 is predominantly paved and VOCs in surface soil would likely volatilize and no longer be present in the soil at the site. Data for 2 to 8 feet bgs are sufficient to capture the nature and extent and risk from VOCs at Site 19.

7.3.2.2 Groundwater

Groundwater samples collected at Site 19 were analyzed for VOCs, SVOCs, PAHs, pesticides and PCBs, and metals (see Table 7-12). Of the samples collected and analyzed, 62 samples for VOCs, 39 samples for SVOCs, 6 samples for PAHs, 11 samples for pesticides and PCBs, and 43 samples for metals were considered acceptable for use in this RI report. Laboratory detection limits for some chemicals in groundwater exceeded residential PRGs (EPA 2002a) and are noted in Table 7-12. Detection limits for some nondetected or detected (at a low frequency) VOCs, SVOCs, and pesticides and PCBs had detection limits exceeding tap water PRGs; however, they were not significantly elevated and are due to the revision of PRGs over time and detection limits that are not always technologically feasible. Arsenic and thallium were detected in groundwater at a low frequency, and detection limits for nondetected samples were also elevated (see Table 7-12). However, Site 19 was not identified as a source of arsenic or thallium (see Section 7.3.1), and concentrations detected in site groundwater are similar to concentrations detected in ambient groundwater.

A subset of these groundwater data was selected for use in the risk assessments (see table below). Data were considered appropriate for use if they (1) were validated, (2) could be used to characterize CERCLA releases, and (3) reflected current site conditions. Data for groundwater were aggregated by contaminant plume rather than site. Data for groundwater later replaced with more current data were not included because they do not reflect current conditions at Site 19. Only data collected under the IRP with the objective of characterizing CERCLA activities were used. Data collected as part of the EBS were not used to evaluate risk because they were collected with DQOs that differ from the CERCLA investigations. At least four quarters of groundwater data from monitoring wells were used. However, if data were lacking for an analytical group, older data were included for all analytical groups. Groundwater data included samples collected from April 1994 to April 2003. Field and screening-level data typically were not used; however, data obtained using direct-push methods were used because of a lack of data from monitoring wells in the concentrated plume areas.

Number of Suitable Groundwater Data for Site 19		
Analytical Group	Suitable for RI	Used in Risk Assessments
VOCs	62	28
SVOCs	39	16
Pesticides/PCBs	11	0
Metals	43	19

Although 11 samples were analyzed for pesticides and 10 for PCBs, these data were not included in the risk assessments because all results were nondetected except for 4,4'-DDT, which was detected at a low concentration in one sample. The limited PCB and pesticide data were not perceived as a data gap because pesticide and PCB use was not an activity identified at Site 19.

7.3.2.3 Soil Gas

Soil gas data were not collected at Site 19.

7.3.3 Site 19 Background Comparison

A background comparison was conducted for Site 19 by comparing a background data set with analytical results for metals in samples representative of Site 19. This comparison was used to determine which metals in soil and groundwater are statistically similar to background and could be considered to be either naturally occurring (background) or potentially resulting from historical site activities. The complete approach is presented in Appendix A and summarized previously in Section 3.4.3.

Metals that exceeded background in soil at Site 19 included copper, iron, lead, and zinc.

Metals that exceeded background in groundwater at Site 19 included aluminum, barium, chromium, copper, iron, manganese, selenium, and vanadium.

7.4 NATURE AND EXTENT OF CHEMICALS IN SOIL AND GROUNDWATER

This section summarizes the nature and extent of contamination in soil and groundwater at Site 19. The nature and extent evaluation summarizes (1) TPH detected at the site, (2) types and concentrations of CERCLA chemicals that most likely were used at the site, and (3) CERCLA chemicals that demonstrate significant risk to human health or the environment (also known as "risk drivers"). Only chemicals that pose risk to human health or the environment (see Appendices H and I) or relate to past site activity are discussed in the sections below. Section 7.4.2, Chemicals Used at Site 19, assisted the Navy in determining whether contamination "hot spots" were present at Site 19. The nature and extent of risk drivers, excluding those that may occur naturally at the site, are evaluated in Section 7.4.3. Risk drivers are those chemicals that pose a cancer risk above $1\text{E-}06$ or an HI above 1 to human receptors or pose significant risk to ecological receptors. The evaluation of risk drivers includes (1) site-specific figures to assess the spatial distribution and concentration patterns of risk drivers and (2) a review of the figures, data, and site hydrology to identify the boundaries of the contamination, the volume of the affected media, and, if possible, the suspected source of the risk drivers at the site.

7.4.1 TPH

Even though TPH is not a CERCLA contaminant, soil and groundwater were sampled at various locations across Site 19 for TTPH, which includes all TPH-fractions (TPH-d, TPH-g, jet fuel, or TPH-mo) and TPH-associated constituents (BTEX, lead, and MTBE).

An evaluation of TPH in soil and groundwater at Site 19 was conducted based on the TPH strategy for Alameda Point (see Appendix F) to assess contamination and possible risk at the site.

On the basis of this evaluation, NFA is recommended at Site 19 under the TPH program for TPH-fractions and TPH-associated constituents. The following potential sources of TPH contamination were identified:

- A fuel pipeline that extends along the western and southern site boundaries, which has been abandoned in place
- Storage of engine parts at Building 609
- Hazardous waste storage area at Yard D-13; spills have been documented, including oil and fuel in 1990
- USTs 616-1 and 616-2, which were overflow protection for the secondary containment at Yard D-13 and closed in place in 1987
- CAA-4B associated with AST 372, which overlaps the northern portion of Site 19

The maximum concentration of TPH-mo (4,680 mg/kg) was detected in a sample collected at a depth of 1 to 2 feet bgs from sampling location B19-17, which is in the northwest corner of Site 19. Two additional samples collected at greater depths from B19-17 had no detectable concentrations of TPH-mo, indicating no significant TPH contamination at depth or at the site. Soil sampling locations are depicted on Figure 7-6.

The maximum concentration of lead (385 mg/kg) was detected in a sample collected at a depth of 10.5 to 11 feet bgs from sampling location BD13-16, which is on the southern side of Yard D-13. Lead was not detected above laboratory detection limits in two of the samples collected at the same location at depths of 1.5 and 5.5 feet bgs, indicating lead was limited to subsurface soil at that location.

Benzene was detected at a concentration of 2 µg/L in a sample from location MWD13-4 (see Figure 7-7). However, during subsequent sampling events at this location from June 2001 to April 2003, benzene was not detected at these concentrations.

7.4.2 Chemicals Used at Site 19

This section focuses on chemicals detected in soil and groundwater that were used historically at Site 19. Site 19 activities included historical and hazardous material storage at Building 616 and Yard D-13. Chemicals believed to be stored include corrosives, halogenated and nonhalogenated organic compounds, paints, metals, asbestos, PCBs, petroleum products, and various types of fuel. Several releases were documented in Yard D-13, including nitric acid, PD-680, poly paint, zyglo penetrant, and mixed oil and fuel (IT 2001). Most of the chemicals detected across Site 19 are consistent with the historical activities known to occur at the site. Statistical summaries of all results for soil and groundwater are presented in Tables 7-11 and 7-12.

Soil

The table below lists the chemicals that most likely were used at Site 19 (or their breakdown components), the residential PRG (EPA 2002a), the range of concentrations detected in soil at the site, and the sampling locations where the maximum concentration of each chemical was detected. It also lists chemicals not detected in soil but detected in groundwater at Site 19. Figure 7-3 shows the sampling locations.

Soil Analytical Results for Chemicals Stored at Site 19			
Chemical	Residential PRG (mg/kg)	Range of Concentrations (mg/kg)	Sampling Location of Maximum Concentration
1,1-DCA	2.8*	0.001	BD13-15 [10.5-11.0]
1,2-DCA	0.28	Not detected	Not available
1,2-DCP	0.34	Not detected	Not available
Benzene	0.6	Not detected	Not available
PCE	1.5	0.002J to 0.004J	BD13-10 [2.0-2.5]
TCE	0.053	0.004J	BD13-10 [2.0-2.5]

Note: Residential PRG is provided for reference only. Risks are quantified in the HHRA section of this document.

* Denotes California-modified PRG

1,1-DCA was detected in one soil sample collected at location BD13-15 at a concentration of 0.001 mg/kg, which is below the reporting limit of 0.006 mg/kg. 1,1-DCA was not detected in any of the four other soil samples collected at that location above the reporting limit or 0.006 mg/kg. BD13-15 is located in the southern portion of Yard D-13, near the area designated for halogenated solvent storage (see Figure 7-2). 1,1-DCA was not detected in any other soil samples collected at Site 19.

PCE was detected in two soils samples collected at location BD13-10, which is in an open area near the northeast corner of Yard D-13. Soil samples collected at depths from 2 to 2.5 and 4.5 to 5 feet bgs exhibited PCE concentrations of 0.004 and 0.002 mg/kg, respectively. Three soil samples collected at greater depths did not contain concentrations of PCE above the reporting limit of 0.006 mg/kg.

TCE was detected at a concentration of 0.004 mg/kg in one soil sample collected from a depth of 2 to 2.5 feet bgs at location BD13-10. No other soil samples exhibited concentrations of TCE above the laboratory reporting limit of 0.006 mg/kg.

Groundwater

The table below lists the chemicals believed to be used at Site 19, the tap water PRGs (EPA 2002a), the range of concentrations detected in groundwater, and the sampling location of the maximum concentration detected. Figures 7-3 shows the sampling locations for groundwater at Site 19.

Groundwater Analytical Results for Chemicals Stored at Site 19			
Chemical	Tap Water PRG (µg/L)	Range of Concentrations (µg/L)	Sampling Location of Maximum Concentration
1,1-DCA	2.0*	0.5 to 27	DHP-S19-02
1,2-DCA	0.12	0.7	DHP-S19-04
1,2-DCP	0.16	2	M19-05
1,1,1-TCA	3,200	0.6 to 8	D19-01
Benzene	0.34	0.2 to 2	MWD13-4
PCE	0.66	0.4J to 22	MWD13-4
TCE	0.028	0.6 to 4.2	MWD13-4

Note: Residential PRGs are provided for reference only. Risks are quantified in the HHRA section of this document.

* Denotes California-modified PRG

VOCs in groundwater are most likely associated with the southwestern corner of Yard D-13 (see Figure 7-2). Halogenated solvents were stored in this area, and it is possible that spills during transport or storage of these chemicals occurred, thereby allowing them to enter the soil column through cracks or other openings in the floor of Yard D-13 or the surrounding grounds.

Several breakdown components of PCE and 1,1,1-TCA also are present at Site 19. The presence of TCE, 1,2-DCE, and 1,1-DCA is likely related to the storage of various hazardous materials at Site 19 and the breakdown of parent chemicals. TCE is a degradation product of PCE by way of dechlorination.

1,1-DCA is a breakdown product of TCA and has been detected in groundwater at relatively low concentrations at several locations at Site 19. The maximum concentration of 1,1-DCA was detected in a groundwater sample collected from 22 feet bgs from an area west of Building 616 at sampling location DHP-S19-02. Groundwater samples collected from monitoring well MWD13-2 also contain detectable concentrations (ranging from 0.5 to 2 µg/L) of 1,1-DCA. It has also been detected in monitoring wells MWD13-1 through MWD13-4 and at Hydropunch location DHP-S19-04 (see Figure 7-2).

1,2-DCA is most commonly used as an additive to solvents and leaded gasoline. 1,2-DCA was detected once in groundwater at Site 19; the sample was collected from Hydropunch sampling location DHP-S19-04 at a depth of 21 feet bgs. No other groundwater samples collected at Site 19 have detectable concentrations of 1,2-DCA.

1,2-DCP was detected in one groundwater sample collected at Site 19. A sample from monitoring well M19-05 exhibited 1,2-DCP at a concentration of 2 µg/L. No other groundwater samples collected at Site 19 have detectable concentrations of 1,2-DCP above reporting limits.

Relatively low concentrations of benzene have been detected in groundwater samples collected from monitoring well MWD13-4, in the southern portion of Yard D-13. Concentrations of benzene in groundwater samples collected at this location range from 2 µg/L (in a sample

collected in 1994) to 0.2 µg/L (in a sample collected in 2003). Benzene has not been detected above reporting limits in any other groundwater samples collected at Site 19.

7.4.3 Risk Drivers

Although numerous chemicals were detected at Site 19, most of the chemicals do not pose significant risk as defined by the risk assessments. As a result, the purpose of this section is to further characterize the nature and extent of CERCLA chemicals driving risk at Site 19 that are not background. Selection of these chemicals was based on the background comparison for metals and on results of the HHRA and ERA. Based on HHRA results, arsenic and BaP were identified as risk drivers in soil, and arsenic, manganese, PCE, and TCE were identified as risk drivers in groundwater at Site 19. Copper, barium, and lead in soil were determined to pose risk to terrestrial ecological receptors. Arsenic and barium in soil and arsenic in groundwater are attributed to background, so the nature and extent of these metals was not evaluated further.

7.4.3.1 Risk Drivers in Soil

This section summarizes on the nature and extent of BaP, copper, and lead in soil.

BaP

BaP ranged from concentrations of 0.000002 to 6 mg/kg, with the maximum concentration detected in a sample from location B009, at a depth of 0.5 to 2.0 feet bgs. Table 7-10 shows the BaP concentrations for all samples collected during the 2003 PAH study. Sampling locations are presented on Figure 7-4F.

Copper

Copper was identified as an ecological risk driver. It was detected in soil at concentrations ranging from 5.9 to 256 mg/kg, with the maximum concentration detected in the southern portion of Yard D-B at sample location BD13-15 at a depth of 8.5 to 9 feet bgs. Ambient concentrations of copper in soil range from 4.2 mg/kg to 89.4 mg/kg.

Lead

Lead was identified as an ecological risk driver. It was detected in soil at concentrations ranging from 6.2 to 385 mg/kg, with the maximum concentration detected in the southeast corner of Yard D-13 at sample location BD13-16 at a depth of 10.5 to 11 feet. Shallower or deeper samples at location BD12-15 are consistent with background concentrations. Ambient concentrations of lead in soil range from 1.3 mg/kg to 41 mg/kg.

7.4.3.2 Risk Drivers in Groundwater

The following discussions focus on the nature and extent of manganese, PCE, and TCE in groundwater.

Manganese

Concentrations of manganese in groundwater at Site 19 were not attributed to background (see Appendix A). The highest concentration of manganese at Site 19 (12,000 µg/L) was detected in a deep well (D19-01). This well is screened in the SWBZ. Groundwater samples collected at the site containing the highest concentrations of manganese (greater than 880 µg/L) were generally collected from monitoring wells screened at depths greater than 20 feet bgs. The highest concentration of manganese in the background data was 2,480 µg/L. Additionally, elevated concentrations of manganese were detected in monitoring well M19-05 (high of 5,480 µg/L).

Manganese is not associated with site activities, but its relatively high concentrations in deeper groundwater at Site 19 are likely associated with the prevalence of reducing conditions at the site and some contribution from saltwater intrusion. Reducing conditions may be associated with organic material present in the BSU and marsh crust. No discernable pattern exists for the distribution of elevated manganese in groundwater except for higher concentrations present in deeper groundwater (D19-01) at Site 19. As discussed in Section 4.0, saltwater intrusion occurs in the SWBZ at Site 19, correlating with the elevated manganese concentrations.

PCE

PCE is a manufactured chemical that was used for metal degreasing and other industrial applications at Alameda Point. It was widely used at Alameda Point in the maintenance of aircraft engines. Waste PCE was likely stored at Yard D-13 before it was disposed of off site.

PCE was detected in groundwater samples collected from monitoring wells MWD13-3 and MWD13-4, located in the southern part of Yard D-13, near the historic halogenated solvent storage area. Low concentrations were detected in samples from well MWD13-3 during 1994 and 1995; these concentrations ranged from an estimated 0.9 to 1 µg/L. Samples collected in 2002 also exhibited low PCE concentrations, at an estimated 0.5 and 0.4 µg/L. At well MWD13-4, located 88 feet upgradient from MWD13-3, concentrations have been increasing since PCE was first detected at this location in 1994. In October 1994, PCE was detected at a concentration of 4 µg/L, increasing to 12 µg/L in August 1995. During the next sampling event in July 2001, PCE was detected at a concentration of 7 µg/L. During 2002 and 2003, PCE was consecutively detected at concentrations of 18, 22, 17, and 12 µg/L in samples collected from well MWD13-3 (see Figure 7-8 and Table 7-12).

In 1994, PCE was detected at a concentration of 5 µg/L in a sample from location DHP-S19-02 in the northern portion of Site 19; the sample was collected at a depth of 22 feet bgs.

Groundwater samples from shallow and deep monitoring wells adjacent to this location and from other points nearby have never exhibited PCE. The one PCE detection may be biased high based on the grab groundwater sampling method.

PCE was detected in soil or groundwater samples collected from any other location at Site 19. No other monitoring wells exist within the immediate vicinity, and PCE was not detected in Hydropunch samples collected in 1994 from locations to the southwest of MWD13-4 and in soil samples collected in 1990 from three locations (BD13-14, BD13-15, and BD13-16) to a depth of 15 feet bgs, near the two monitoring wells. Because the yard operated until 1996, it is possible that the releases of PCE to soil and groundwater at Site 19 occurred after the soil samples were collected in 1990 and that an area of contaminated soil may exist underneath Yard D-13. The full extent of the PCE in groundwater is not defined.

TCE

TCE, a degradation product of PCE, has been detected in groundwater at three locations at Site 19. These detections were found in one Hydropunch location (DHP-S19-02) near Building 616 and at two monitoring wells (MWD13-3 and MWD13-4) where PCE contamination exists, near the halogenated solvent storage area (see Figure 7-9).

In 1994, TCE was detected at a concentration of 4 µg/L in a sample from location DHP-S19-02 in the northern portion of Site 19, at a depth of 22 feet bgs. TCE has never been detected in soil or groundwater samples from shallow and deep monitoring wells adjacent to this location and other location nearby.

Concentrations of TCE in the monitoring wells MWD13-3 and MWD13-4 in the southern portion of Yard D-13 exhibit trends similar to the detection of PCE in the same wells. TCE has been detected in only 2 of 11 samples collected from well MWD13-3 in the last 13 years. In July 2001 and June 2002, TCE was detected at concentrations of 0.7 and 0.6 µg/L, respectively. TCE was not detected during the last sampling event in December 2002. TCE has been detected in seven of nine samples collected from well MWD13-4, upgradient of well MWD13-3. Concentrations in the seven samples ranged from 0.9 µg/L (in 1994) to 4.4 µg/L (in September 2002). TCE was detected at a concentration of 3.6 µg/L in December 2002 and at 2.6 µg/L in April 2003. Table 7-12 presents all groundwater data for TCE at Site 19.

Neither PCE nor TCE was detected in monitoring well M19-05, located upgradient of the monitoring wells (MWD13-3 and MWD13-4). No other monitoring wells exist within the immediate vicinity, and TCE was not detected in Hydropunch samples collected in 1994 from locations to the southwest of MWD13-4 and in soil samples collected in 1990 from three locations (BD13-14, BD13-15, and BD13-16) to a depth of 15 feet bgs, near the two monitoring wells.

TCE present in samples from MWD13-3 and MWD13-4 is most likely a breakdown product of PCE, discussed previously. Based on the recent detections of TCE in groundwater, it appears

that PCE at Site 19 is degrading into TCE. It is possible that a release of PCE to soil and groundwater occurred after the 1990 and 1994 investigations and that an area of contaminated soil may exist underneath Yard D-13. The full extent of the TCE in groundwater is not defined.

7.5 FATE AND TRANSPORT

The objective of this evaluation is to determine whether the chemicals driving risk at Site 19 (1) have migrated or degraded, (2) are being released from a continuing source of contamination, and (3) are likely to be distributed by groundwater or along other potential pathways. The chemicals driving risk in soil and groundwater at Site 19 include PAHs, copper, lead, manganese, and VOCs (PCE and TCE).

7.5.1 PAHs in Soil

PAHs, quantified as BaP equivalents, degrade extremely slowly in the environment and bind to organic matter in soil. In addition, they are mostly insoluble in water; therefore, they exhibit low potential for migration. The PAHs found at Site 19 likely will remain in their present state (ATSDR 1995a).

7.5.2 Copper and Lead in Soil

Copper mobility in soil is affected by pH, oxidation-reduction reactions, and formation of complexes. In general, copper will adsorb to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. Copper can participate in ionic exchange reactions on the negatively charged surfaces of clay minerals. In acid soils, the reaction is reversible. With increased pH, however, the sorption reactions may become irreversible. Copper also may precipitate as insoluble copper compounds, or form complexes or chelates by interaction with organic matter. Available data suggest that organic matter is more effective than inorganic constituents in keeping copper unavailable (ATSDR 2002a).

Lead is relatively immobile under most soil conditions because it sorbs to organic matter and forms complexes with inorganic clays. Only acidic conditions and low sulfate concentrations could increase the mobility of significant quantities of lead in groundwater (Lindsay 1979). The soil pH at Site 19 is generally greater than 6.

7.5.3 Manganese in Groundwater

The transport and partitioning of manganese in water is controlled by the solubility of the specific chemical form present, which is determined by pH, oxidation-reduction potential, and the characteristics of the available anions. Manganese (II) is the most soluble and most mobile form of manganese found in groundwater. Manganese (II) predominates in most waters (pH 4 to 7) but may become oxidized at a pH greater than 8 or 9. The principal anion associated with manganese (II) in water is usually carbonate, and the concentration of manganese is limited by the relatively low solubility (65 mg/L) of manganese carbonate. In relatively oxidized water, the

solubility of manganese (II) may also be controlled by manganese oxide equilibrium. In extremely reduced water, the fate of manganese tends to be controlled by formation of a poorly soluble sulfide.

Elevated manganese concentrations at Site 13 may be attributable to reducing conditions associated with organic material present in the BSU, marsh crust, refinery waste, and saltwater intrusion. As discussed in Section 4.0, saltwater intrusion occurs in the SWBZ at Site 19, correlating with the elevated manganese concentrations. Manganese at Site 19 is likely associated with the prevalence of reducing conditions at the site and some contribution from salt water intrusion.

7.5.4 VOCs in Groundwater

The storage of hazardous waste at the site ceased in 1996, and Yard D-13 received regulatory closure in 1999. The source of contamination at Site 19 was removed in 1996, when hazardous waste storage activities ceased.

PCE has been detected at Site 19 since 1994. Primary breakdown components or "daughter products" of PCE such as TCE and 1,2-DCE have been detected in groundwater. 1,1,1-TCA also has been detected along with two daughter products, 1,1-DCE and 1,1-DCA. The absence of additional breakdown components such as vinyl chloride suggests that relatively small quantities of chlorinated hydrocarbons were released at Site 19 during the last 10 years.

Chlorinated hydrocarbon plumes in groundwater appear to be stable with only slight decreasing or increasing trends over 13 years of groundwater monitoring. The parent compounds, PCE and 1,1,1-TCA, have only been detected in low concentrations, and hazardous material storage activities have stopped at Site 19. It is expected that chlorinated hydrocarbons will continue to degrade through dechlorination and migrate toward the west, in the direction of groundwater flow (see Figure 7-4H).

7.6 HHRA

A summary of the HHRA methodology is presented in Section 3.4.6. The summary includes details pertaining to the selection of the data set, the selection of COPCs, the exposure assessment, the toxicity assessment, and the risk characterization and uncertainty. Additional detailed information is provided in the HHRA (see Appendix H).

Various data were used to characterize risk at Site 19. These data included collecting soil samples, groundwater samples from wells, and grab groundwater samples, where necessary. Grab groundwater samples collected from 1994 to 2001 were used to represent the spatial distribution of the risk at Site 19.

Carcinogenic risks and noncancer health hazards calculated for Site 19 are summarized in this section on a media-by-media basis, including surface soil, subsurface soil, groundwater (vapor

intrusion pathways), and groundwater (domestic use pathways). As noted in Section 3.4.6, the following receptors were evaluated in the HHRA: current/future commercial/industrial worker, future construction worker, future hypothetical resident, future construction worker intrusive exposure scenario (deep soil 0 to 8 feet bgs), and future hypothetical resident intrusive exposure scenario.

The total RME carcinogenic risks and noncancer HIs for Site 19 are summarized in Table 7-13. The total CTE carcinogenic risks and noncancer HIs for Site 19 are presented in Table 7-14. Risk for each media and pathway also is presented in the tables.

7.6.1 Risks from Soil

Commercial/industrial and construction worker scenarios are considered the most likely exposure scenarios. For soil, the highest total RME carcinogenic cancer risk (including background) based on the industrial worker scenario is **6E-06**, which is within the risk management range of 1E-06 to 1E-04. The total RME HI (including background) based on the construction worker scenario is **0.1**, which is less than the risk management HI of 1. The RME risk results are summarized in Table 7-13 and detailed in Appendix H. For soil, the highest total CTE carcinogenic risk (including background) based on the industrial worker scenario is **2E-07**, which is less than the risk management range of 1E-06 to 1E-04. The total CTE HI (including background) based on the industrial worker scenario is **0.006**, which is below an HI of 1. The CTE risk results are summarized in Table 7-14 and detailed in Appendix H.

The residential scenario is considered the most conservative estimate of risk. Soil data were aggregated in depth intervals of 0 to 2 feet bgs (surface soil) and 0 to 8 feet bgs (subsurface soil). For surface soil, the total RME carcinogenic cancer risks (including background) based on the residential scenario is **5E-05**, which is within the risk management range of 1E-06 to 1E-04. The total RME HIs (including background) based on the residential scenario is **0.6**, which is less than the risk management HI of 1 (see Table 7-13). Arsenic and BaP were identified as risk drivers under the residential scenario. No noncancer risk drivers were identified in surface soil.

For surface soil, the total CTE carcinogenic risks (including background) based on the residential scenario is **6E-06**, which is within the risk management range of 1E-06 to 1E-04. The total CTE HI (including background) based on the residential scenario is **0.1**, which is less than the risk management HI of 1 (see Table 7-14).

For subsurface soil (0 to 8 feet bgs), the total RME carcinogenic cancer risks (including background) based on the residential scenario is **5E-05**, which is within the risk management range of 1E-06 to 1E-04. Most risk is due to incidental ingestion, dermal contact, and ingestion of homegrown produce with arsenic (6E-05) and benzo(a)pyrene (1E-06). The total RME HIs (including background) based on the residential scenario are **0.5**, which is below the risk management HI of 1. Accordingly, arsenic and BaP are identified as carcinogenic risk drivers. No noncancer risk drivers were identified in subsurface soil.

For subsurface soil, the total CTE carcinogenic cancer risks (including background) based on the residential scenario is **7E-06**, which is within the risk management range of 1E-06 to 1E-04. The total CTE HI (including background) based on the residential scenario is **0.1**, which is less than the risk management HI of 1. Tables 7-13 and 7-14 present the RME and CTE risks for each subsurface soil pathway.

Although lead was selected as a COPC in subsurface soil, the EPC for lead (55 mg/kg in subsurface soil) did not exceed the California-modified residential PRG (EPA 2002a). This nonexceedance suggests that no receptor would have unacceptable blood lead levels from exposure to soils (that is, there is a low potential for unacceptable effects).

7.6.2 Risks from Groundwater

Groundwater pathways for the construction worker receptor were not considered complete; therefore, groundwater was not evaluated for these scenarios. Groundwater was evaluated for the commercial/industrial and residential scenarios.

The Tier 1 risk screening did not result in COPCs for the vapor intrusion pathway at Site 19.

For dermal contact, inhalation, and ingestion of groundwater, the total RME carcinogenic risk (including background) based on the residential scenario is **2E-04**, which exceeds the risk management range. The total RME HI (including background) based on the residential scenario is **17**, which exceeds the risk management HI of 1. The following carcinogenic and noncancer risk drivers were identified for groundwater:

- 1,2-DCP
- Arsenic
- Manganese
- PCE
- TCE

The total CTE carcinogenic risk (including background) based on the residential scenario is **5E-05**, which is within the risk management range of 1E-06 to 1E-04. The total CTE HI (including background) based on the residential scenario is **15**, which is above an HI of 1.

Most RME carcinogen risk (2E-04) is associated with ingestion of arsenic in groundwater, which was not considered significantly greater than background for Site 19; the total carcinogenic risk not attributable to arsenic concentrations is approximately **3E-05**, which is within the risk management range for carcinogens.

Most of the HI is associated with ingestion of arsenic (2) and ingestion of manganese (14); of these, only manganese is considered significantly greater than background in groundwater. However, these two analytes may have increased solubility associated with reducing conditions perpetuated by natural attenuation of organic compounds in groundwater. The HI associated with exposure to groundwater that is not related to these two inorganic chemicals is approximately 0.7, which is less than the risk management HI of 1 for noncarcinogens.

7.6.3 HHRA Conclusions

Commercial/industrial and construction worker scenarios are considered the most likely exposure scenarios. The most conservative carcinogenic risk for soil for these two scenarios is within the risk management range. The highest HIs calculated for these pathways were less than 1 for soil. The pathway for exposure to groundwater was incomplete.

The residential exposure scenario also was evaluated. HHRA results indicated carcinogenic risks from exposure to soil are within the risk management range and noncancer risks from soil are less than 1. HHRA results indicated carcinogenic and noncancer risks from exposure to groundwater were above the risk management range and above an HI of 1, respectively.

The tables below summarize the HHRA results for carcinogenic and noncancer risks under the residential scenario. The tables also list the risk drivers and their relative contributions to carcinogenic risk and the noncancer HI for exposure to soil and groundwater under the RME residential exposure scenario.

Site 19 Cancer Risk, Residential Scenario Receptor: Potential Future Adult/Child		
Medium	Chemical Risk Drivers	RME Cancer Risk
Surface Soil	Arsenic ^a	5E-05
	BaP	2E-06
Groundwater	1,2-DCP	1E-06
	Arsenic ^a	2E-04
	TCE	2E-05
	PCE	9E-06
Subtotal Risk (risk drivers only ^b):		3E-04
Total Site Risk (all chemicals):		3E-04

Notes

a Background, as discussed in Section 7.3.3 and Appendix A

b Risk drivers are compounds that individually pose greater than 1E-06 risk

Site 19 Noncancer Risk, Residential Scenario Receptor: Potential Future Child		
Medium	Chemical Risk Drivers	RME Noncancer HI
Soil	None	0.6
Subtotal for Soil:		5E-05
Groundwater	Arsenic ^a	2
	Manganese	14
Subtotal Risk (risk drivers only ^b):		16
Total Site Risk (all chemicals):		17

Notes:

a Background, as discussed in Section 7.3.3 and Appendix A

b Risk drivers are compounds that individually have HI values greater than 1

HHRA results indicated that carcinogenic risks from exposure to soil are within the risk management range and that noncancer risks from soil are less than 1; furthermore, risk in soil is attributable to background concentrations of arsenic. The carcinogenic and noncancer risks for groundwater exceed the risk management range.

7.7 ERA

This section summarizes the results of the modified screening-level ERA conducted for Site 19 (see Appendix I). The modified screening-level ERA was conducted because Site 19 has limited habitat and because site-specific ecological sampling to support a baseline ERA is not feasible. This ERA is intended to be a conservative estimate, using more realistic exposure parameters for the ecological endpoints defined than would typically be used for a screening-level ERA.

The process used to conduct the modified screening-level ERA comprises the following components:

- Screening for COPECs
- Problem formulation
- Exposure estimates and risk evaluation
- Evaluation of assessment results

These components are summarized in the following sections.

7.7.1 Screening for COPECs

COPECs are organic and inorganic chemicals defined as potentially related to site activity and potentially causing adverse effects to ecological receptors. Evaluating site-specific data is the

first step in quantifying risks and identifying potential hazards at each site. Data for the ERA were selected using the approach described in Section 3.4.7. Soil data for each site were aggregated at a depth interval of 0 to 4 feet bgs. Summaries of the soil data used for Site 19 are presented in Appendix I.

Groundwater at Site 19 was not assessed for two reasons: (1) groundwater does not discharge at the ground surface, and (2) groundwater occurs at depths such that exposure to burrowing animals is expected to be minimal. For aquatic receptors, it is unlikely that chemicals in groundwater at Site 19 will reach surface water and affect ecological receptors because the site is more than 1,000 feet from the Bay and the Seaplane Lagoon. Therefore, an exposure pathway for aquatic receptors was not considered complete.

Table 7-15 presents the data used to develop COPECs for Site 19. Chemicals detected in soil were subjected to a screening process to focus the ERA on chemicals that are related to site activity and that pose the greatest potential risk to ecological receptors. The screening process was performed sequentially to consider factors such as frequency of detection, spatial distribution of detected chemicals, statistical comparison to background concentrations for inorganic chemicals, and chemical properties such as bioaccumulation and toxicity. The COPEC approach is described in further detail in Section 3.4.7.

7.7.2 Problem Formulation

Problem formulation represents the stage of the ERA process where the goals, breadth, and focus of the assessment are determined. The major goal of the problem formulation component is to develop an ecological conceptual site model.

Current and reasonable future uses of Site 19 were evaluated to determine the presence and potential future formation of habitat and to identify complete exposure pathways that might exist at the site. Currently ecological habitat capable of supporting significant wildlife is not present at Site 19; therefore, exposure pathways for terrestrial receptors were considered complete to provide a conservative estimate of risk. Using a fully exposed soil scenario, the following complete exposure pathways for Site 19 were evaluated:

- Direct exposure to soil
- Food chain exposure

Selected assessment and measurement endpoints for soil are presented in Section 3.4.7.

7.7.3 Exposure Estimates and Risk Evaluation

The exposure estimate and risk calculation step results in a conservative estimate of potential risk to the selected measurement endpoints. Using risk calculations, soil doses were then compared to TRVs or ERVs to evaluate potential risks to each ecological receptor, and an HQ (a ratio that

is indicative of potential risks to ecological receptors) was derived. HQ results for soil at Site 19, using high and low TRVs, are presented in Table 7-16.

7.7.4 Evaluation of ERA Results

High and low TRVs were used to provide a bounding estimate of risk to each endpoint. The high TRV represents an upper bounding limit, which is the lowest concentration where adverse effects are known to occur. The low TRV represents the lower bounding limit, which is the highest concentration a endpoint can be exposed to where adverse effects are known not to occur. If both HQ values for a chemical in soil were below 1.0, then the chemical was not considered to pose a potential for risk to ecological receptors. Metals with one or both bounding limit HQs exceeding 1.0 were further compared to calculated background HQs for metals in soil (see Table 7-17). Chemicals with HQs above 1.0 and above background concentrations were further evaluated based on each chemical's frequency of detection and distribution at the site, the range of concentrations detected, and its absorption potential and toxicity to each ecological receptor. This type of analysis provides additional weight-of-evidence data to support risk management decisions for Site 19.

7.7.4.1 Risk to Small Mammals

All soil COPECs were evaluated at Site 19 for small mammal populations (California ground squirrel is the measurement endpoint). Literature data were not adequate to develop an ERV for 4-chloro-3-methylphenol, n-nitroso-diphenylamine, and 1,2-dichlorobenzene for small mammals; therefore, these chemicals were evaluated qualitatively. This section briefly discusses the evaluation of risk to small mammals from COPECs that exceeded HQs of 1.0, as well as those that were qualitatively evaluated.

Soil COPECs with HQs above 1.0 included bis(2-ethylhexyl)phthalate, di-n-butylphthalate, copper, PCP, and zinc. The HQs using low TRVs for copper, zinc, and di-n-butylphthalate were above 1.0. The metal COPECs were further considered in a weight-of-evidence approach. After background concentrations at Alameda Point, the absorption potential of the chemical, the frequency of detection, and the concentrations detected at Site 19 were considered, zinc was determined to pose no significant potential for risk to small mammals, while the potential for risk from copper cannot be dismissed. The high HQ using the low TRV for di-n-butylphthalate is directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ value for this chemical. The ecological risk to small mammals from this SVOC cannot be discounted; however, it is expected to be low based on the low frequency of detection and low concentration of the compound in soils at Site 19.

The SVOCs bis(2-ethylhexyl)phthalate and PCP had HQs above 1.0 using both the high and low TRVs. The high HQ values are directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ values for these chemicals. The ecological risk to small mammals from these SVOCs cannot be discounted; however, it is expected to be low based on the low frequency of detection and low concentration of these compounds in soils at Site 19.

The qualitative evaluation of risk to small mammals from exposure to 4-chloro-3-methylphenol, n-nitroso-diphenylamine, and 1,2-dichlorobenzene involved assessing the weight-of-evidence parameters. Based on the low detection of frequency and relatively low concentrations detected at Site 19, as well as the knowledge that SVOCs generally cause toxic effects only at higher doses, risk to small mammals from these chemicals is expected to be low.

7.7.4.2 Risk to Passerines

All soil COPECs were evaluated at Site 19 for passerine populations (Alameda song sparrow and the American robin are the measurement endpoints). Literature data were not adequate to develop an ERV for 4-chloro-3-methylphenol, diethylphthalate, HMW and LMW PAHs, n-nitroso-diphenylamine, PCP, 1,3-dichlorobenzene, acetone, methylene chloride, PCE, toluene, TCE, and xylene; therefore, these chemicals were evaluated qualitatively. This section briefly discusses the evaluation of risk to passerine populations from COPECs that exceeded HQs of 1.0 and those that were qualitatively evaluated.

Soil COPECs with HQs above 1.0 included lead and the SVOCs bis(2-ethylhexyl)phthalate and di-n-butylphthalate. HQs for the Alameda song sparrow and the American robin using the high TRV for lead were below 1.0. The HQs using the low TRVs for lead in the song sparrow and the robin were 14.8 and 49.5, which exceeded the background HQs of 2.71 and 9.07, respectively. However, these HQs may be driven by the overly conservative low TRV. Using the allometrically converted TRVs for the passerines, low TRV HQs for lead at Site 19 were below 1.0 for both the song sparrow and the robin. Based on this information, lead at Site 19 poses no significant potential for risk to passerines.

The SVOCs bis(2-ethylhexyl)phthalate and di-n-butylphthalate had HQs above 1.0 using both the high and low TRVs. The high HQ values are directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ values for these chemicals. The ecological risk to passerines from these SVOCs cannot be discounted; however, it is expected to be low based on the low frequency of detection, low concentration of the compounds in soils at Site 19, and low toxicity to birds.

The qualitative evaluation of risk to passerines from exposure to 4-chloro-3-methylphenol, HMW and LMW PAHs, diethylphthalate, n-nitroso-diphenylamine, PCP, 1,3-dichlorobenzene, acetone, methylene chloride, PCE, toluene, TCE, and xylene involved assessing the weight-of-evidence parameters. Studies indicate that PAH chemicals do not appear to bioaccumulate in mammals and birds (Eisler 1987a). Additionally, based on the relatively low frequencies of detection and low concentration of PAHs and SVOCs (4-chloro-3-methylphenol, diethylphthalate, n-nitroso-diphenylamine, and PCP), risk posed to passerines from these ecological COPECs is expected to be low. Only residual levels of VOCs are present in soils at Site 19. Mammals and birds generally metabolize VOCs quickly; therefore, the risk posed to passerines from such residual levels of VOCs is expected to be low.

7.7.4.3 Risk to Raptors

All soil COPECs were evaluated at Site 19 for raptor populations (red-tailed hawk is the measurement endpoint). Literature data were not adequate to develop an ERV for 4-chloro-3-methylphenol, diethylphthalate, HMW and LMW PAHs, n-nitroso-diphenylamine, PCP, 1,3-dichlorobenzene, acetone, methylene chloride, PCE, toluene, TCE, and xylene for raptor populations; therefore, these chemicals were evaluated qualitatively. This section briefly discusses the evaluation of risk to raptors from COPECs that exceeded HQs of 1.0 and those that were qualitatively evaluated.

Soil COPEC with HQs above 1.0 included barium, lead, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate. The high HQ value for barium was 2.46, while the low HQ value was 4.95. These values were above the barium background HQs of 0.0687 and 0.217, respectively. Barium was detected in 21 of 24 samples collected at Site 19, at concentrations ranging from 15.3 to 570 mg/kg. Background concentrations of barium ranged from 0.3 to 198 mg/kg. Toxic effects of barium to birds are not well documented. Based on this information, barium poses a potential risk to raptors at Site 19.

The high TRV HQ for lead was below 1.0, while the low TRV HQ for lead was 482; however, these HQs may be driven by the overly conservative low TRV. Using the allometrically converted TRV for raptors, the low TRV lead HQs at Site 19 was 1.33, while the background HQ was 0.0603. Based on this information, lead at Site 19 poses a potential risk to raptors.

The SVOCs bis(2-ethylhexyl)phthalate and di-n-butylphthalate had HQs above 1.0 using both the high and low TRVs. The high HQ values are directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ values for these chemicals. The ecological risk to raptors from these SVOCs cannot be discounted; however, it is expected to be low based on the low frequency of detection, low concentration of the compounds in soils at Site 19, and low toxicity to birds.

The qualitative evaluation of risk to raptors from exposure to 4-chloro-3-methylphenol, HMW and LMW PAHs, diethylphthalate, n-nitroso-diphenylamine, PCP, 1,3-dichlorobenzene, acetone, methylene chloride, PCE, toluene, TCE, and xylene involved assessing the weight-of-evidence parameters. Studies indicated that PAHs do not appear to bioaccumulate in mammals and birds (Eisler 1987a). Additionally, based on the relatively low frequencies of detection and low concentrations of PAHs and SVOCs (4-chloro-3-methylphenol, diethylphthalate, n-nitroso-diphenylamine, and PCP), risk posed to raptors from these ecological COPECs is expected to be low. Only residual levels of VOCs are present in soils at Site 19. Mammals and birds generally metabolize VOCs quickly; therefore, the risk posed to raptors from such residual levels of VOCs is expected to be low.

7.7.5 Uncertainty

The screening-level ERA process involves a large number of uncertainties and extrapolations to evaluate potential risk to ecological receptors. Many of the assumptions in the screening-level

ERA process are conservative and result in overestimates of site-specific parameters. Uncertainties associated with the ERA are identified in Section 3.4.7.5.

7.7.6 ERA Conclusions

Results of the HQ calculations and qualitative evaluations indicated potential risk to small mammals from copper and to raptors from barium and lead. No significant risk to passerines occurs from exposure to Site 19 soils. Based on the lack of habitat at Site 19 and the planned future use of the site, no risks to ecological receptors were identified that require further evaluation or mitigation.

7.8 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of the evaluations conducted in support of the CERCLA risk management process are presented in Sections 7.8.1 (nature and extent) and 7.8.2 (risk assessments), and the overall recommendations for Site 19 are presented in Section 7.8.3.

7.8.1 Nature and Extent Conclusions

The nature and extent evaluation concluded that most of the chemicals detected across Site 19 are consistent with historical activities known to occur at the site, which included hazardous material storage at Building 616 and Yard D-13. Physical features of Site 19, along with specific details on the hazardous waste storage practices associated with these wastes, were used to identify potential sources of CERCLA chemicals. Environmental investigations were conducted in these areas to identify and assess the extent of CERCLA chemicals in soil and groundwater, and the analytical results were evaluated. The following physical features and site activities were considered likely sources at Site 19:

- Yard D-13 (hazardous waste storage yard)
- Building 616 (hazardous materials storage area)
- Fill material containing PAHs

Most of the chemicals related to hazardous waste storage (DCA, TCA, benzene, PCE, TCE, and PAHs) were detected within the vicinity of Yard D-13 and Building 616, with the maximum detected concentrations near Yard D-13.

1,1-DCA, PCE, and TCE were detected in one to two samples of shallow soil near the area designated for halogenated solvent storage in the southern portion of Yard D-13. It is possible that spills occurred during transport or storage of these chemicals, thereby allowing them to enter the soil column through cracks or other openings in the floor of Yard D-13 or the surrounding grounds.

PCE and TCE were also detected in a groundwater monitoring well in the southern portion of Yard D-13 and in a deep monitoring well in the northern portion of Site 19 near Building 616. PCE and TCE were not detected in any other monitoring wells within the immediate vicinity of Building 616. Relatively low concentrations of benzene also were detected in groundwater in the southern portion of Yard D-13. The highest detected concentration of 1,1-DCA in groundwater was in a Hydropunch sample collected to the west of Building 616. 1,2-DCA was detected only in a Hydropunch sample collected south of Yard D-13. 1,2-DCP was detected once in a monitoring well east of Yard D-13. The full extent of VOCs in groundwater is not fully defined.

BaP is likely associated with PAHs present in fill material used to build Alameda Island. BaP equivalent concentrations ranged from 0.000002 to 0.6745 mg/kg, compared to the action level of 0.62 mg/kg, with the maximum concentration detected in a soil sample at a depth of 0.5 to 2.0 feet bgs.

Although numerous chemicals were detected at Site 19, some of the chemicals do not pose significant risk as defined by the risk assessments. Significant risk to human health is potentially posed by arsenic and BaP in soil and by arsenic, manganese, PCE, and TCE in groundwater. Barium, copper, and lead were determined to pose risk to terrestrial ecological receptors. Arsenic and barium in soil and arsenic in groundwater are attributed to background concentrations.

Manganese is not believed to be associated with site activity, but its relatively high concentrations in deeper groundwater at Site 19 are likely associated with the prevalence of reducing conditions at the site from organic material present in the BSU and marsh crust and some contribution from saltwater intrusion. There is no discernable pattern to the distribution of elevated manganese in groundwater except for higher concentrations present in deeper groundwater at Site 19.

Data gaps for soil and groundwater at Site 19 were also identified. Detection limits were elevated in both soil and groundwater for some nondetected SVOCs; therefore, further sampling and analysis of soil and groundwater for SVOCs may be needed to confirm these chemicals are not present in soil or groundwater at Site 19. Because data are limited, the full extent of VOCs in groundwater still needs to be defined.

Although these data gaps were identified, it was determined that the types and numbers of samples collected at Site 19 and the analytical suite were adequate to characterize the site and to conduct risk assessments because data collection at the site focused mainly on potential sources and was conducted in phases. This phased approach afforded stakeholders opportunities to provide feedback on the suitability or adequacy of the data collected and the need for additional data to identify releases and complete the RI report. There is a low potential that a source at Site 19 was not adequately evaluated or that NFA would be recommended if it poses a potential risk to human health or the environment.

7.8.2 Risk Assessment Conclusions

An HHRA and modified screening-level ERA were conducted to evaluate risk from chemicals detected at Site 19. The sections below present the conclusions for the HHRA and ERA, respectively.

7.8.2.1 HHRA Conclusions

According to reuse plans for Alameda Point (EDAW 1996), commercial/industrial and construction worker exposures are the most likely future exposures at Site 19. Human health risk was evaluated for commercial/industrial and construction worker exposures, along with residential exposures. The residential exposure scenario was evaluated to allow for flexibility in implementing the reuse plan (or modifications thereto) at Alameda Point, and because EPA risk assessment guidance (EPA 1989) includes a strong preference for evaluation of the residential pathway.

For the commercial/industrial and construction worker scenarios, the most conservative carcinogenic risks for soil and groundwater are within the risk management range. The highest HIs calculated for these pathways were less than 1 for soil. The pathway for exposure to groundwater was incomplete.

The tables in Section 7.6.3 summarized the HHRA results for carcinogenic and noncancer risks under the residential scenario. Those tables also list risk drivers and their relative contributions to carcinogenic risk and the noncancer HI for exposure to soil and groundwater under the RME residential exposure scenario. For the residential scenario, the HHRA indicated that carcinogenic risk from exposure to soil is within the risk management range and that noncancer risk from soil is less than 1; furthermore, risk from soil is attributable to PAHs and background concentrations of arsenic. The carcinogenic and noncancer risks for groundwater exceed the risk management range and are attributable to the following:

- 1,2-DCP
- Arsenic
- TCE
- PCE
- Manganese

Although lead was selected as a COPC in subsurface soil, the EPC for lead (55 mg/kg in subsurface soil) did not exceed the California-modified residential PRG (EPA 2002a). This nonexceedance suggests that no human receptor would have unacceptable blood lead levels as a result of exposure to soils (that is, there is a low potential for unacceptable effects).

7.8.2.2 ERA Conclusions

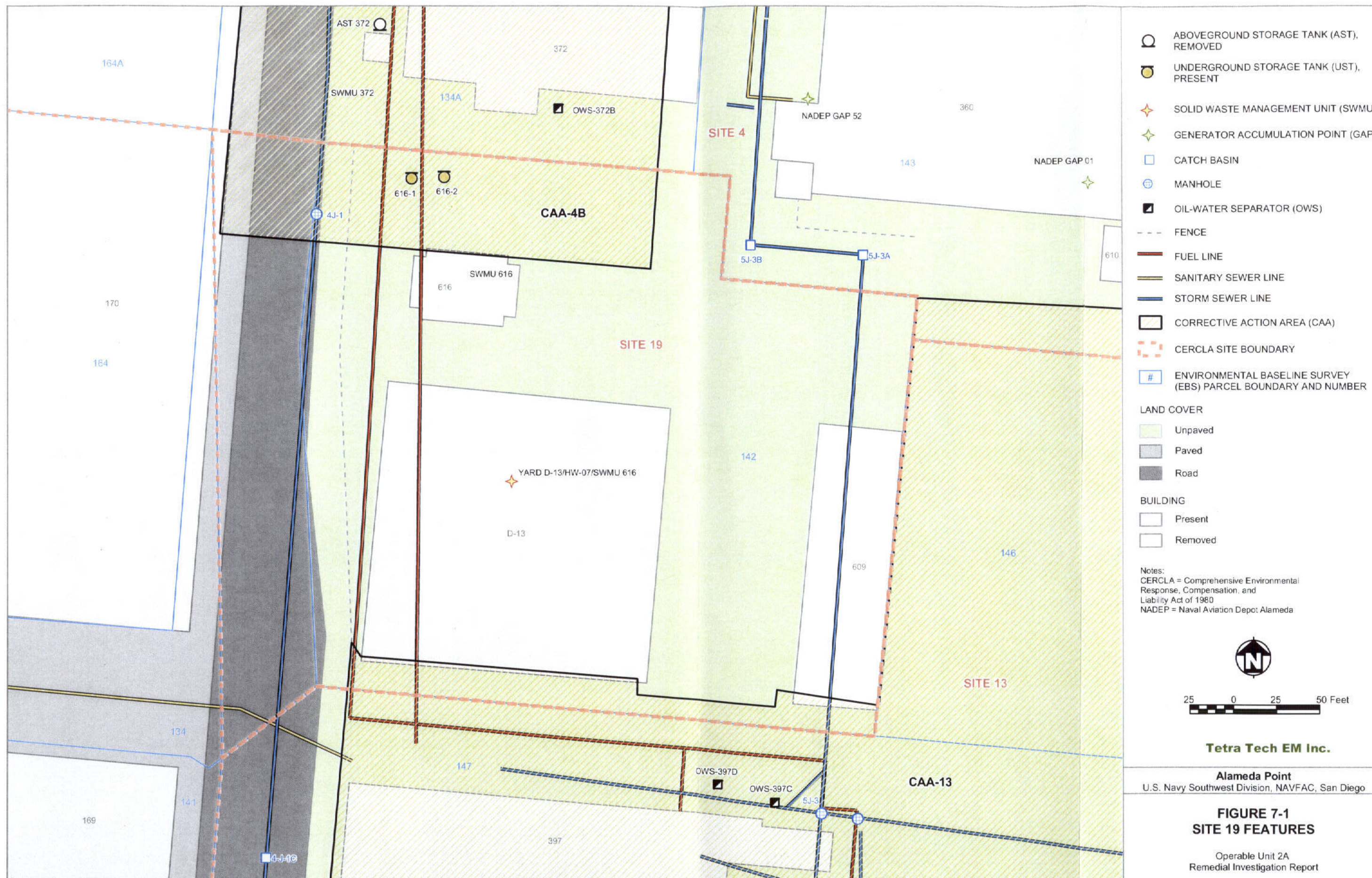
A site-specific ERA was conducted for Site 19 to estimate potential risks to the environment. Currently, ecological habitat capable of supporting significant wildlife is not present at Site 19; therefore, exposure pathways for terrestrial receptors were considered potentially complete to provide a conservative estimate of risk. Risk to marine receptors was not evaluated because exposure pathways for aquatic receptors were considered incomplete. Assessment endpoints included small mammals, passerines, raptors, and marine receptors.

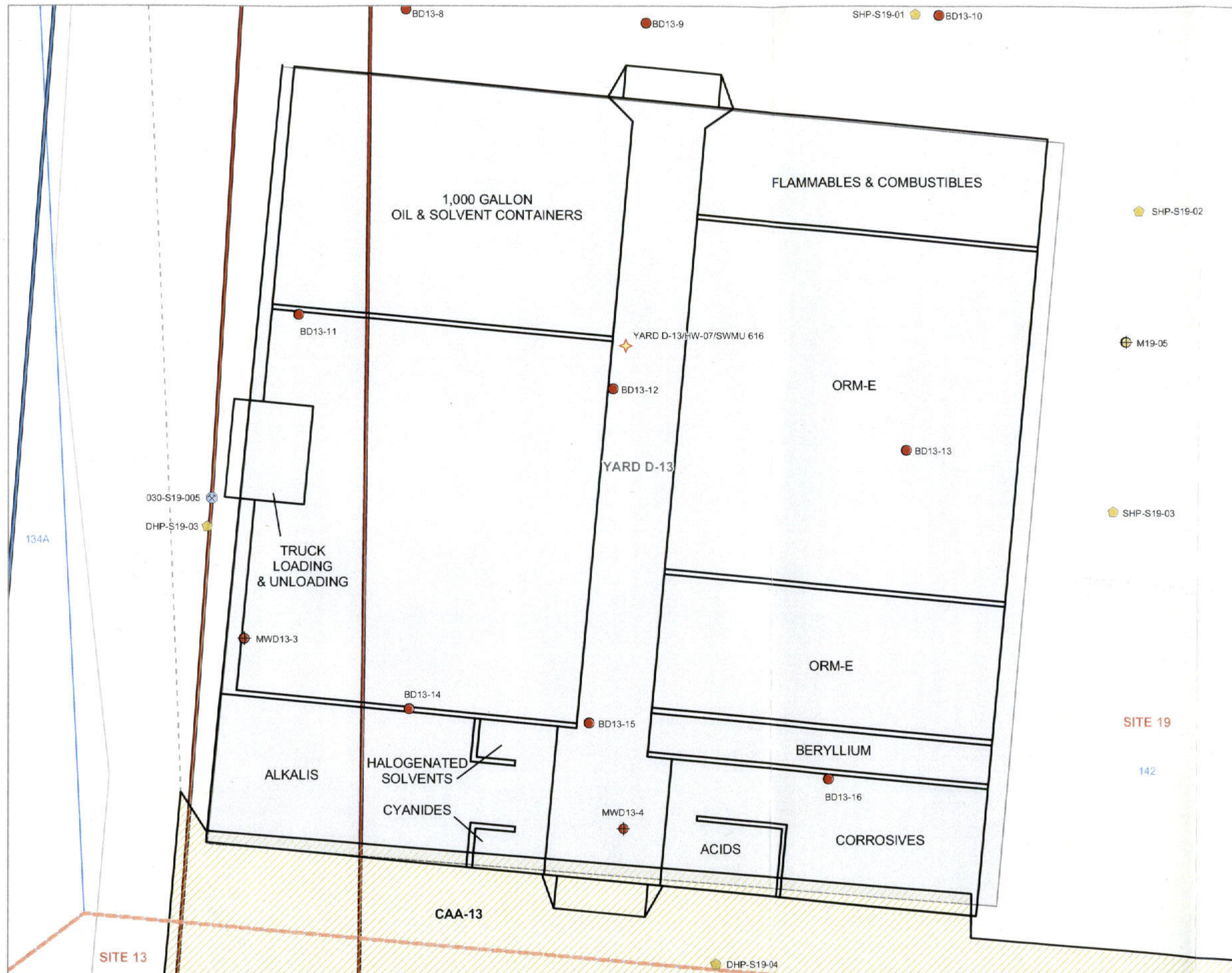
Results of the HQ calculations and qualitative evaluations indicated potential risk to small mammals from copper and potential risk to raptors from barium and lead. No significant risk is posed to passerines from exposure to Site 19 soils. However, based on the lack of habitat at Site 19 and the planned future use of the site, no risks to ecological receptors have been identified that require further evaluation or mitigation.

7.8.3 Recommendations

Based on the data and risk assessments discussed previously, soil and groundwater at Site 19 are recommended for further evaluation in an FS, as defined under CERCLA, to address risks to residential receptors under the unrestricted reuse scenario. Total site risk to residential receptors (including background) is above the risk management range. No COCs are identified for soil. Arsenic and BaP in soil were identified as risk drivers, but arsenic is attributed to background. Because of the use of sediments to construct the base, an ambient concentration of PAHs (BaP) exists in soil at Alameda Point. BaP at Site 19 is attributed to the Marsh Crust; therefore, the Marsh Crust ROD is applicable, and BaP is not recommended as a COC for further evaluation in the FS. COCs identified for groundwater at Site 19 are manganese, PCE, and TCE. Although arsenic was identified as a risk driver, it is attributed to background.

An evaluation of TPH in soil and groundwater was conducted based on the TPH strategy for Alameda Point (Navy 2001a) (see Appendix F). Based on this evaluation, NFA is recommended at Site 19 under the TPH program for TPH-fractions and TPH-associated constituents.





SAMPLE LOCATION

- ⊗ Excavation
- ⬡ Hydropunch
- ⊕ Monitoring Well
- Soil Boring

KEY TO SAMPLE LOCATION INVESTIGATION

- Follow-On Investigation 1994
- Phase 1 & 2A, 1991
- Total Petroleum Hydrocarbon Program
- ★ SOLID WASTE MANAGEMENT UNIT (SWMU)
- FENCE
- FUEL LINE
- STORM SEWER LINE
- ▭ CORRECTIVE ACTION AREA (CAA)
- ▭ CERCLA SITE BOUNDARY
- ▭ ENVIRONMENTAL BASELINE SURVEY (EBS) PARCEL BOUNDARY AND NUMBER
- ▭ LAND COVER
- ▭ BUILDING
- ▭ Present
- ▭ Removed

Notes:
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 ORM-E = Other Regulated Material-E
 Source: Operation Plan, Hazardous Waste Storage Facility Yard D-13, NAVFAC, 1990



10 0 10 20 Feet

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 U.S. Navy Southwest Division, NAVFAC, San Diego

FIGURE 7-2 SITE 19 YARD D-13 DETAIL

Operable Unit 2A
 Remedial Investigation Report

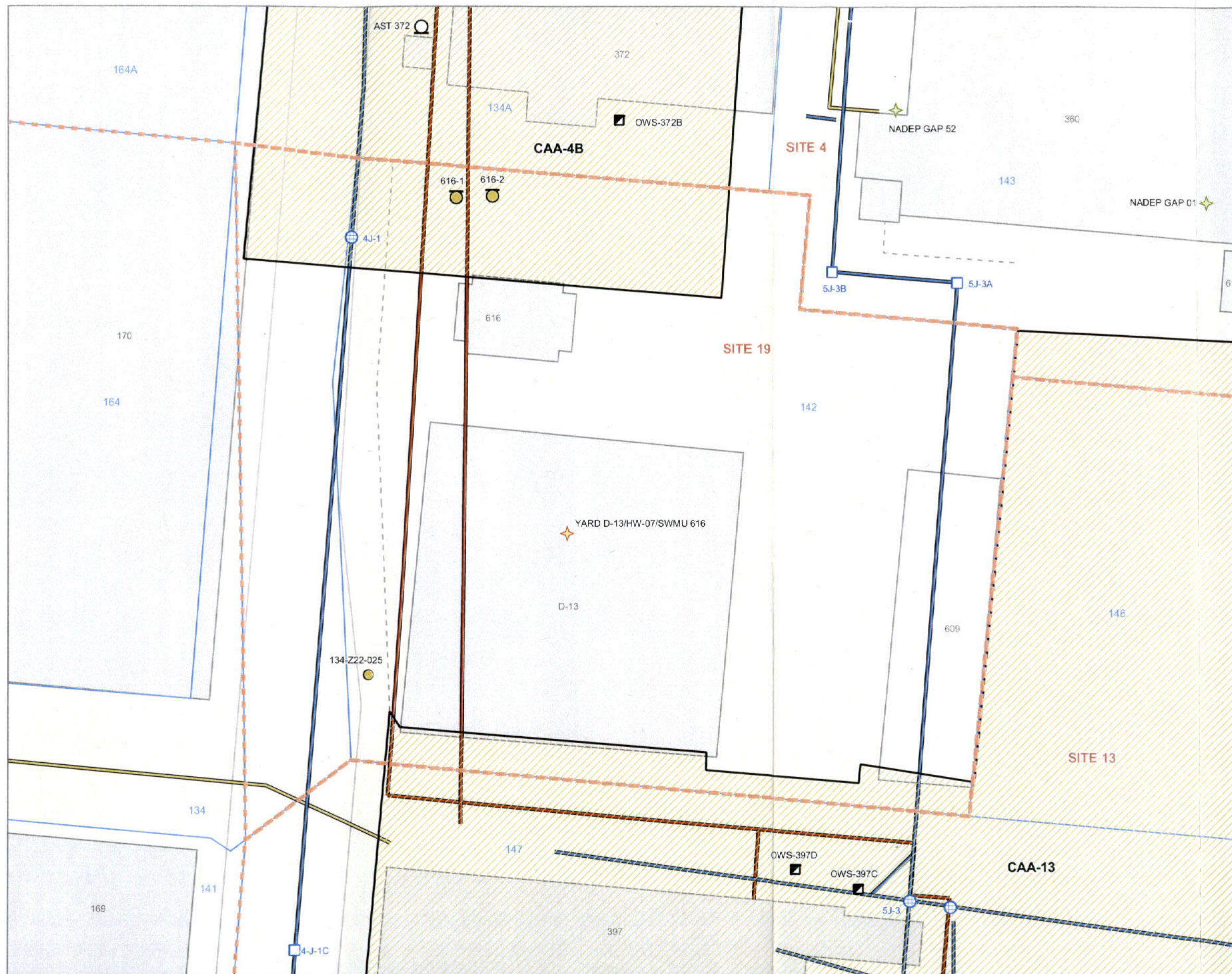












SAMPLING LOCATION

- Soil Boring
- ABOVEGROUND STORAGE TANK (AST), REMOVED
- UNDERGROUND STORAGE TANK (UST), PRESENT
- ★ SOLID WASTE MANAGEMENT UNIT (SWMU)
- ★ GENERATOR ACCUMULATION POINT (GAP)
- CATCH BASIN
- ⊕ MANHOLE
- OIL-WATER SEPARATOR (OWS)
- FENCE
- FUEL LINE
- SANITARY SEWER LINE
- STORM SEWER LINE
- CORRECTIVE ACTION AREA (CAA)
- CERCLA SITE BOUNDARY
- # ENVIRONMENTAL BASELINE SURVEY (EBS) PARCEL BOUNDARY AND NUMBER
- LAND COVER
- BUILDING
- Present
- Removed

Notes:
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 NADEP = Naval Aviation Depot Alameda
 PCB = Polychlorinated Biphenyl



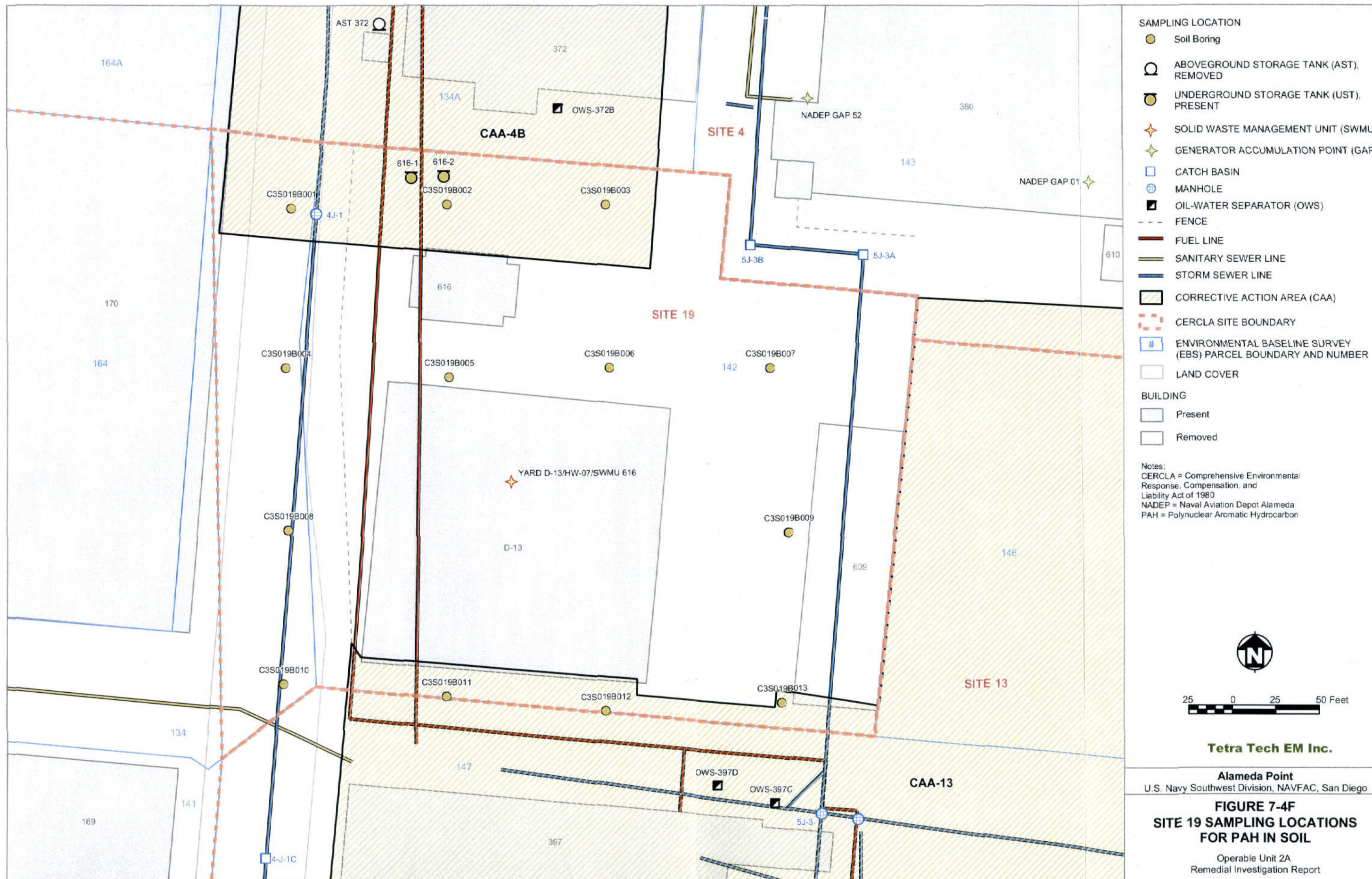
25 0 25 50 Feet

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FIGURE 7-4E SITE 19 SAMPLING LOCATIONS FOR PCBs IN SOIL

Operable Unit 2A
 Remedial Investigation Report















SAMPLING LOCATION

- Monitoring Well
- ABOVEGROUND STORAGE TANK (AST), REMOVED
- UNDERGROUND STORAGE TANK (UST), PRESENT
- SOLID WASTE MANAGEMENT UNIT (SWMU)
- GENERATOR ACCUMULATION POINT (GAP)
- CATCH BASIN
- MANHOLE
- OIL-WATER SEPARATOR (OWS)
- FENCE
- FUEL LINE
- SANITARY SEWER LINE
- STORM SEWER LINE
- CORRECTIVE ACTION AREA (CAA)
- CERCLA SITE BOUNDARY
- ENVIRONMENTAL BASELINE SURVEY (EBS) PARCEL BOUNDARY AND NUMBER
- LAND COVER

BUILDING

- Present
- Removed

Notes:
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 NADEP = Naval Aviation Depot Alameda
 PAH = Polynuclear Aromatic Hydrocarbon



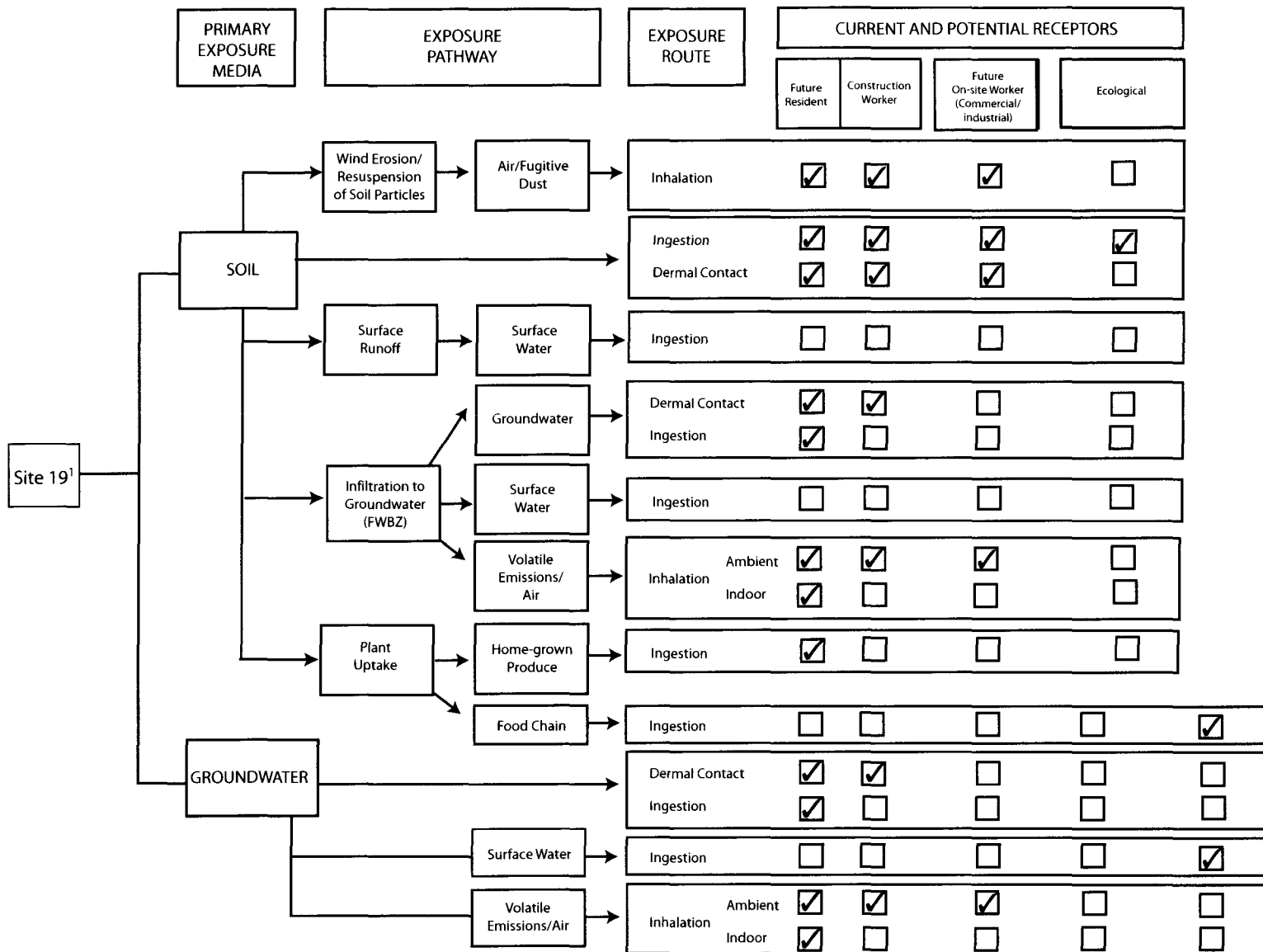
25 0 25 50 Feet

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FIGURE 7-4L SITE 19 SAMPLING LOCATIONS FOR PAHs IN GROUNDWATER

Operable Unit 2A
 Remedial Investigation Report



¹Yard D-13, Building 616, fill material

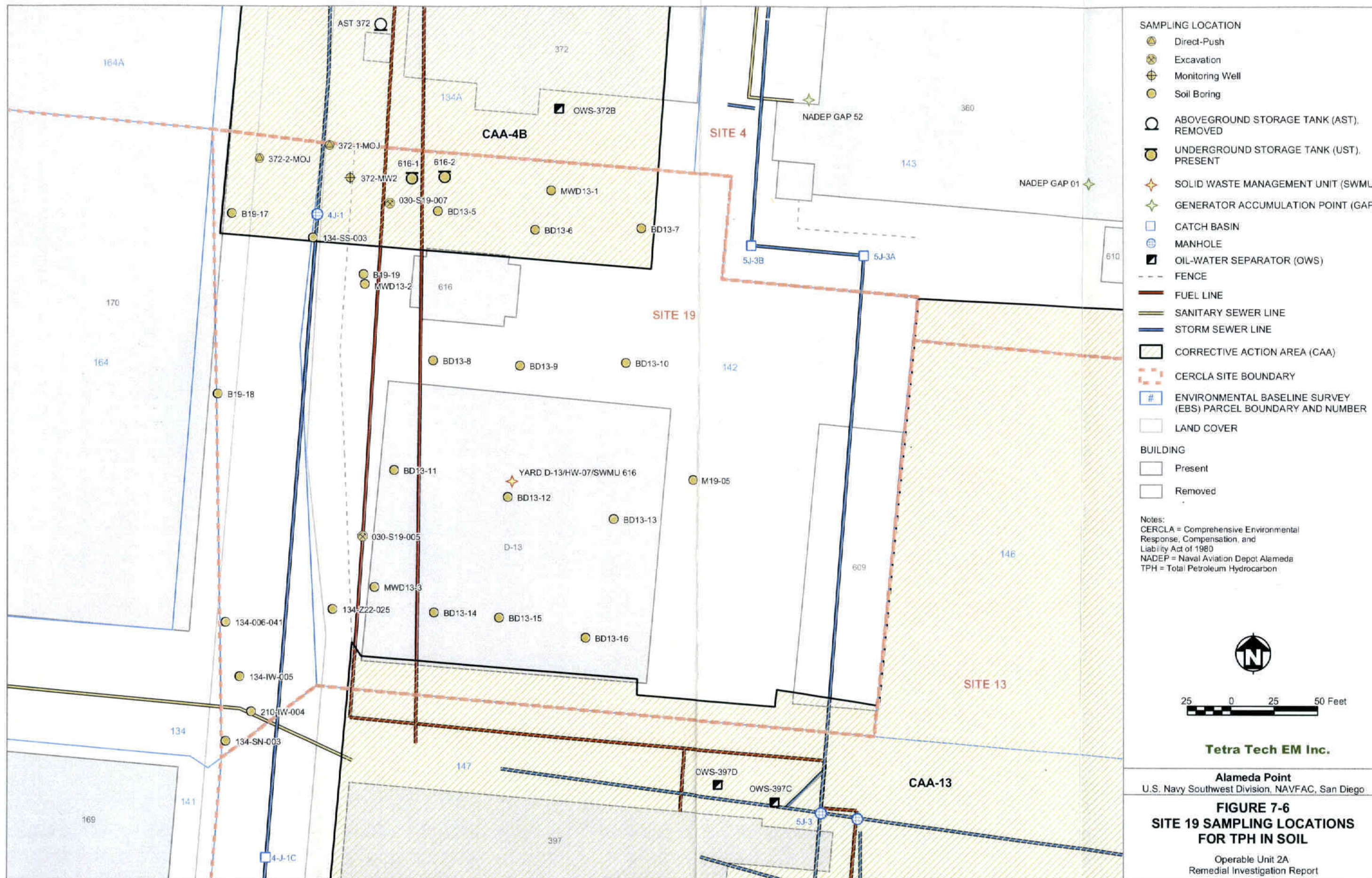
☒ Potentially Complete Exposure Pathway



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FIGURE 7-5
CONCEPTUAL SITE MODEL
Operable Unit 2A
Remedial Investigation Report





- SAMPLING LOCATION**
- Direct-Push
 - Hydropunch
 - Monitoring Well
- ABOVEGROUND STORAGE TANK (AST), REMOVED**
- UNDERGROUND STORAGE TANK (UST), PRESENT**
- SOLID WASTE MANAGEMENT UNIT (SWMU)**
- GENERATOR ACCUMULATION POINT (GAP)**
- CATCH BASIN**
- MANHOLE**
- OIL-WATER SEPARATOR (OWS)**
- FENCE**
- FUEL LINE**
- SANITARY SEWER LINE**
- STORM SEWER LINE**
- CORRECTIVE ACTION AREA (CAA)**
- CERCLA SITE BOUNDARY**
- ENVIRONMENTAL BASELINE SURVEY (EBS) PARCEL BOUNDARY AND NUMBER**
- LAND COVER**
- BUILDING**
- Present
 - Removed
- Notes:**
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 NADEP = Naval Aviation Depot Alameda
 TPH = Total Petroleum Hydrocarbon

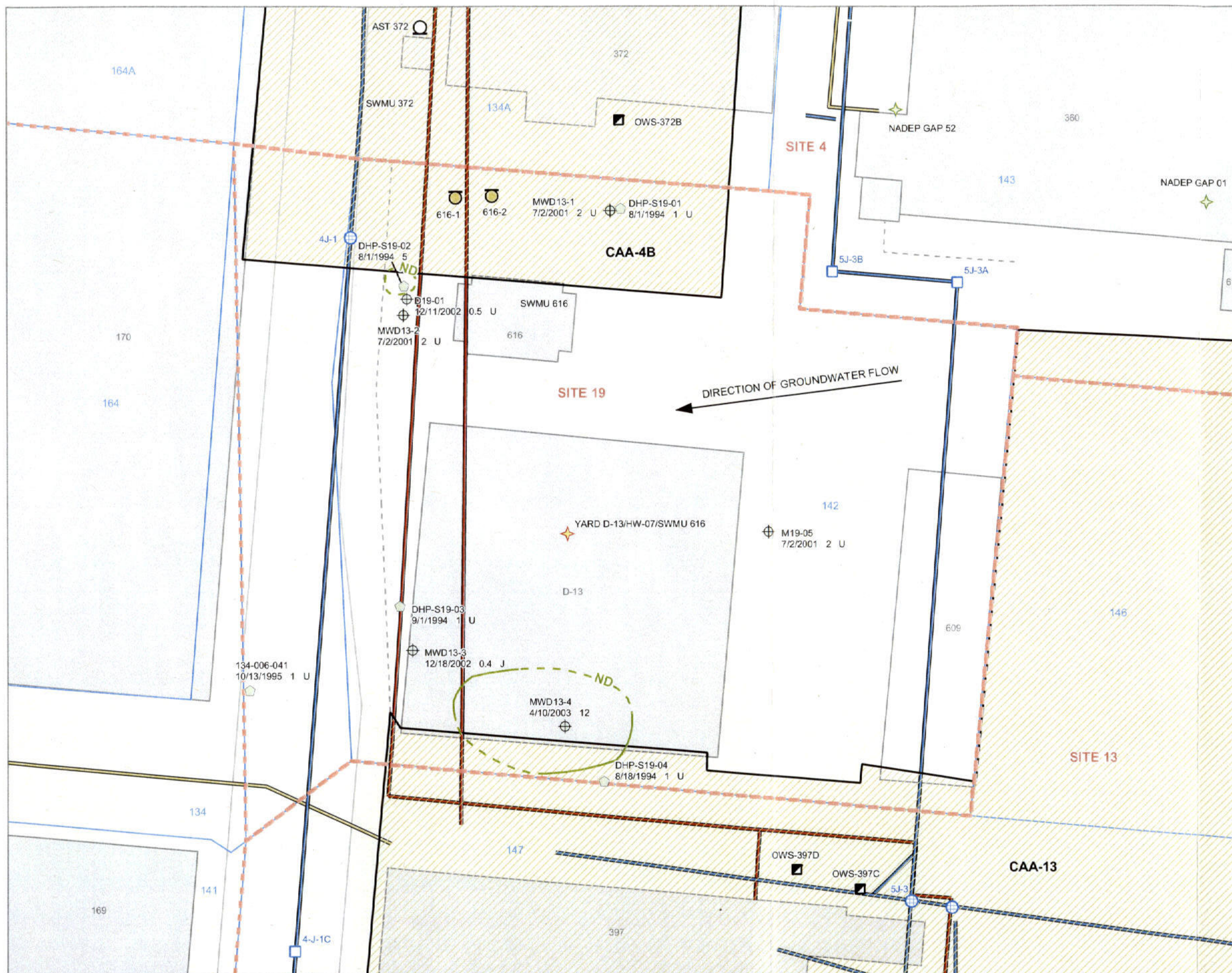


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 U.S. Navy Southwest Division, NAVFAC, San Diego

FIGURE 7-7
SITE 19 SAMPLING LOCATIONS
FOR TPH IN GROUNDWATER

Operable Unit 2A
 Remedial Investigation Report



- SAMPLE LOCATION**
- Hydropunch
 - Monitoring Well
 - ABOVEGROUND STORAGE TANK (AST), REMOVED
 - UNDERGROUND STORAGE TANK (UST), PRESENT
 - SOLID WASTE MANAGEMENT UNIT (SWMU)
 - GENERATOR ACCUMULATION POINT (GAP)
 - CATCH BASIN
 - MANHOLE
 - OIL-WATER SEPARATOR (OWS)
 - APPROXIMATE EXTENT OF PCE PLUME (DASHED WHERE INFERRED)
 - FENCE
 - FUEL LINE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
 - CORRECTIVE ACTION AREA (CAA)
 - CERCLA SITE BOUNDARY
 - ENVIRONMENTAL BASELINE SURVEY (EBS) PARCEL BOUNDARY AND NUMBER
 - LAND COVER
- BUILDING**
- Present
 - Removed

Notes:
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 J = Estimated
 NADEP = Naval Aviation Depot Alameda
 ND = Non-detected
 PCE = Tetrachloroethene
 U = Not detected
 Groundwater data used in the RI were collected between 1990 and April 2003.

25 0 25 50 Feet



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Alameda Point
 U.S. Navy Southwest Division, NAVFAC, San Diego

FIGURE 7-8
SITE 19
TETRACHLOROETHENE
IN GROUNDWATER
 Operable Unit 2A
 Remedial Investigation Report



Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California
Page 1 of 8

[illegible]

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

Page 2 of 8

SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										
				SVOC	VOC	PAH	Pesticides/ PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	Organic Lead
Phases 1 & 2A Investigation, 1991 (Continued)														
BD13-8	BD13-8 [0.5-1.0]	07/05/1990	0.5 - 1	X	--	--	X	X	--	X	--	--	X	--
	BD13-8 [1.0-1.5]	07/05/1990	1 - 1.5	--	--	--	--	--	--	--	--	--	--	--
	BD13-8 [2.5-3.0]	07/03/1990	2.5 - 3	X	X	--	--	--	--	--	--	--	--	--
	BD13-8 [3.0-3.5]	07/05/1990	3 - 3.5	--	--	--	X	X	X	X	--	--	X	--
	BD13-8 [6.0-6.5]	07/03/1990	6 - 6.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-8 [8.0-8.5]	07/05/1990	8 - 8.5	--	--	--	--	--	--	X	--	--	--	--
	BD13-8 [10.5-11.0]	07/03/1990	10.5 - 11	X	X	--	--	--	--	--	--	--	--	--
	BD13-8 [11.0-11.5]	07/05/1990	11 - 11.5	--	--	--	X	X	--	X	--	--	X	--
	BD13-8 [12.5-13.0]	07/03/1990	12.5 - 13	X	X	--	--	--	--	--	--	--	--	--
BD13-9	BD13-8 [13.0-13.5]	07/05/1990	13 - 13.5	--	--	--	X	X	--	X	--	--	X	--
	BD13-8 [14.5-15.0]	07/03/1990	14.5 - 15	--	X	--	--	--	--	--	--	--	--	--
	BD13-9 [0.5-1.0]	07/05/1990	0.5 - 1	X	--	--	X	X	X	X	--	--	X	--
	BD13-9 [1.0-1.5]	07/05/1990	1 - 1.5	--	--	--	--	--	X	--	--	--	--	--
	BD13-9 [2.0-2.5]	07/03/1990	2 - 2.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-9 [3.5-4.0]	07/05/1990	3.5 - 4	--	--	--	X	X	X	X	--	--	X	--
	BD13-9 [5.0-5.5]	07/03/1990	5 - 5.5	X	X	--	--	--	--	--	--	--	--	--
	BD13-9 [8.0-8.5]	07/05/1990	8 - 8.5	--	--	--	X	X	--	X	--	--	X	--
	BD13-9 [8.5-9.0]	07/05/1990	8.5 - 9	X	X	--	--	--	--	--	--	--	--	--
BD13-10	BD13-9 [11.0-11.5]	07/05/1990	11 - 11.5	--	--	--	--	--	--	X	--	--	--	--
	BD13-9 [11.5-12.0]	07/18/1990	11.5 - 12	--	X	--	--	--	--	--	--	--	--	--
	BD13-9 [14.0-14.5]	07/03/1990	14 - 14.5	X	X	--	--	--	--	--	--	--	--	--
	BD13-9 [14.5-15.0]	07/05/1990	14.5 - 15	--	--	--	X	X	--	X	--	--	X	--
	BD13-10 [0.5-1.0]	07/05/1990	0.5 - 1	--	--	--	X	X	X	--	--	--	X	--
	BD13-10 [1.5-2.0]	07/05/1990	1.5 - 2	--	--	--	--	--	X	--	--	--	--	--
	BD13-10 [2.0-2.5]	07/05/1990	2 - 2.5	X	X	--	--	--	--	--	--	--	--	--
	BD13-10 [3.0-3.5]	07/05/1990	3 - 3.5	--	--	--	X	X	--	X	--	--	X	--
	BD13-10 [4.5-5.0]	07/05/1990	4.5 - 5	--	X	--	--	--	--	--	--	--	--	--
	BD13-10 [5.0-5.5]	07/05/1990	5 - 5.5	--	--	--	--	--	--	X	--	--	--	--
	BD13-10 [7.5-8.0]	07/05/1990	7.5 - 8	X	X	--	--	--	--	--	--	--	--	--
	BD13-10 [8.0-8.5]	07/05/1990	8 - 8.5	--	--	--	X	X	--	X	--	--	X	--
	BD13-10 [10.5-11.0]	07/05/1990	10.5 - 11	--	X	--	--	--	--	--	--	--	--	--
	BD13-10 [11.0-11.5]	07/05/1990	11 - 11.5	--	--	--	--	--	--	X	--	--	--	--
	BD13-10 [13.5-14.0]	07/05/1990	13.5 - 14	X	X	--	--	--	--	--	--	--	--	--
	BD13-10 [14.0-14.5]	07/05/1990	14 - 14.5	--	--	--	X	X	--	X	--	--	X	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

Page 3 of 8

SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										
				SVOC	VOC	PAH	Pesticides/ PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	Organic Lead
Phases 1 & 2A Investigation, 1991 (Continued)														
BD13-11	BD13-11 [1.0-1.5]	07/10/1990	1 - 1.5	X	--	--	X	X	--	X	--	--	X	--
	BD13-11 [1.5-2.0]	07/10/1990	1.5 - 2	--	--	--	--	--	X	--	--	--	--	--
	BD13-11 [2.5-3.0]	07/10/1990	2.5 - 3	--	X	--	--	--	--	--	--	--	--	--
	BD13-11 [4.0-4.5]	07/10/1990	4 - 4.5	X	--	--	X	X	X	--	--	--	X	--
	BD13-11 [6.0-6.5]	07/10/1990	6 - 6.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-11 [9.0-9.5]	07/10/1990	9 - 9.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-11 [11.5-12.0]	07/10/1990	11.5 - 12	X	--	--	X	X	--	--	--	--	X	--
	BD13-11 [12.5-13.0]	07/10/1990	12.5 - 13	--	X	--	--	--	--	X	--	--	--	--
BD13-12	BD13-11 [13.0-13.5]	07/10/1990	13 - 13.5	X	--	--	X	X	--	--	--	--	X	--
	BD13-11 [15.0-15.5]	07/09/1990	15 - 15.5	--	X	--	X	--	--	--	--	--	--	--
	BD13-12 [1.5-2.0]	07/09/1990	1.5 - 2	X	--	--	X	X	--	--	--	--	X	--
	BD13-12 [2.0-2.5]	07/09/1990	2 - 2.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-12 [3.0-3.5]	07/09/1990	3 - 3.5	--	--	--	--	--	X	X	--	--	--	--
	BD13-12 [4.5-5.0]	07/09/1990	4.5 - 5	X	--	--	X	X	X	--	--	--	X	--
	BD13-12 [5.0-5.5]	07/09/1990	5 - 5.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-12 [8.5-9.0]	07/09/1990	8.5 - 9	--	X	--	--	--	--	X	--	--	--	--
BD13-13	BD13-12 [9.5-10.0]	07/09/1990	9.5 - 10	X	--	--	X	X	--	--	--	--	X	--
	BD13-12 [10.5-11.0]	07/09/1990	10.5 - 11	--	X	--	--	--	--	X	--	--	--	--
	BD13-12 [12.0-12.5]	07/09/1990	12 - 12.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-12 [14.5-15.0]	07/09/1990	14.5 - 15	X	--	--	X	X	--	--	--	--	X	--
	BD13-12 [15.0-15.5]	07/09/1990	15 - 15.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-13 [2.0-2.5]	07/11/1990	2 - 2.5	X	--	--	X	X	--	X	--	--	X	--
	BD13-13 [2.5-3.0]	07/11/1990	2.5 - 3	--	--	--	--	--	X	--	--	--	--	--
	BD13-13 [7.0-7.5]	07/09/1990	7 - 7.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-13 [8.0-8.5]	07/11/1990	8 - 8.5	X	--	--	X	X	X	--	--	--	X	--
	BD13-13 [8.5-9.0]	07/11/1990	8.5 - 9	--	X	--	--	--	--	X	--	--	--	--
	BD13-13 [9.5-10.0]	07/09/1990	9.5 - 10	--	X	--	--	--	--	X	--	--	--	--
	BD13-13 [11.0-11.5]	07/11/1990	11 - 11.5	X	--	--	X	X	--	--	--	--	X	--
	BD13-13 [12.0-12.5]	07/09/1990	12 - 12.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-13 [14.0-14.5]	07/11/1990	14 - 14.5	X	--	--	X	X	--	--	--	--	X	--
	BD13-13 [14.5-15.0]	07/09/1990	14.5 - 15	X	--	--	--	--	--	--	--	--	--	--
	BD13-13 [15.0-15.5]	07/09/1990	15 - 15.5	--	X	--	--	--	--	X	--	--	--	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

Page 4 of 8

SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										
				SVOC	VOC	PAH	Pesticides/ PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	Organic Lead
Phases 1 & 2A Investigation, 1991 (Continued)														
BD13-14	BD13-14 [2.0-2.5]	07/09/1990	2 - 2.5	X	--	--	X	X	--	--	--	--	X	--
	BD13-14 [2.5-3.0]	07/09/1990	2.5 - 3	--	--	--	--	--	X	X	--	--	--	--
	BD13-14 [3.5-4.0]	07/09/1990	3.5 - 4	--	X	--	--	--	--	--	--	--	--	--
	BD13-14 [4.0-4.5]	07/09/1990	4 - 4.5	X	--	--	X	X	X	--	--	--	X	--
	BD13-14 [9.5-10.0]	07/09/1990	9.5 - 10	--	X	--	--	--	--	X	--	--	--	--
	BD13-14 [13.5-14.0]	07/09/1990	13.5 - 14	--	X	--	--	--	--	X	--	--	--	--
	BD13-14 [14.0-14.5]	07/09/1990	14 - 14.5	X	--	--	X	X	--	--	--	--	X	--
	BD13-14 [14.5-15.0]	07/09/1990	14.5 - 15	--	X	--	--	--	--	X	--	--	--	--
	BD13-14 [15.0-15.5]	07/09/1990	15 - 15.5	X	--	--	X	X	--	--	--	--	X	--
BD13-15	BD13-14 [15.5-16.0]	07/09/1990	15.5 - 16	--	X	--	--	--	--	X	--	--	--	--
	BD13-15 [2.0-2.5]	07/10/1990	2 - 2.5	X	--	--	X	X	--	X	--	--	X	--
	BD13-15 [2.5-3.0]	07/10/1990	2.5 - 3	--	--	--	--	--	X	--	--	--	--	--
	BD13-15 [4.0-4.5]	07/10/1990	4 - 4.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-15 [8.5-9.0]	07/10/1990	8.5 - 9	X	--	--	X	X	X	--	--	--	X	--
	BD13-15 [10.5-11.0]	07/10/1990	10.5 - 11	--	X	--	--	--	--	X	--	--	--	--
	BD13-15 [11.5-12.0]	07/10/1990	11.5 - 12	--	X	--	--	--	--	X	--	--	--	--
	BD13-15 [12.5-13.0]	07/10/1990	12.5 - 13	X	--	--	X	X	--	--	--	--	X	--
	BD13-15 [13.0-13.5]	07/10/1990	13 - 13.5	--	X	--	--	--	--	X	--	--	--	--
BD13-16	BD13-15 [13.5-14.0]	07/10/1990	13.5 - 14	X	--	--	X	X	--	--	--	--	X	--
	BD13-15 [14.5-15.0]	07/09/1990	14.5 - 15	--	X	--	X	--	X	--	--	--	X	--
	BD13-16 [1.5-2.0]	07/10/1990	1.5 - 2	X	--	--	X	X	--	X	--	--	X	--
	BD13-16 [2.0-2.5]	07/10/1990	2 - 2.5	--	--	--	--	--	X	--	--	--	--	--
	BD13-16 [3.0-3.5]	07/10/1990	3 - 3.5	--	X	--	--	--	--	--	--	--	--	--
	BD13-16 [5.0-5.5]	07/10/1990	5 - 5.5	X	--	--	X	X	X	--	--	--	X	--
	BD13-16 [6.0-6.5]	07/10/1990	6 - 6.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-16 [9.0-9.5]	07/10/1990	9 - 9.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-16 [10.5-11.0]	07/10/1990	10.5 - 11	X	--	--	X	X	--	--	--	--	X	--
MWD13-1	BD13-16 [12.0-12.5]	07/10/1990	12 - 12.5	--	X	--	--	--	--	X	--	--	--	--
	BD13-16 [13.5-14.0]	07/10/1990	13.5 - 14	X	--	--	X	X	--	--	--	--	X	--
	BD13-16 [14.0-14.5]	07/10/1990	14 - 14.5	--	X	--	--	--	--	X	--	--	--	--
	MWD13-1 [0.5-1.0]	07/11/1990	0.5 - 1	X	--	--	X	X	--	X	--	--	X	--
	MWD13-1 [1.0-1.5]	07/11/1990	1 - 1.5	--	--	--	--	--	X	--	--	--	--	--
	MWD13-1 [3.5-4.0]	07/11/1990	3.5 - 4	--	X	--	--	--	--	--	--	--	--	--
	MWD13-1 [7.0-7.5]	07/11/1990	7 - 7.5	X	--	--	X	X	X	--	--	--	X	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										Organic Lead
				SVOC	VOC	PAH	Pesticides/PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	
Phases 1 & 2A Investigation, 1991 (Continued)														
MWD13-1 (Continued)	MWD13-1 [8.5-9.0]	07/11/1990	8.5 - 9	--	X	--	--	--	--	--	X	--	--	--
	MWD13-1 [9.5-10.0]	07/11/1990	9.5 - 10	--	X	--	--	--	--	--	X	--	--	--
	MWD13-1 [10.0-10.5]	07/11/1990	10 - 10.5	X	--	--	X	X	--	--	--	--	X	--
	MWD13-1 [12.5-13.0]	07/11/1990	12.5 - 13	--	X	--	--	--	--	--	X	--	--	--
	MWD13-1 [13.0-13.5]	07/11/1990	13 - 13.5	X	--	--	X	X	--	--	--	--	X	--
MWD13-2	MWD13-1 [14.0-14.5]	07/11/1990	14 - 14.5	--	X	--	--	--	--	--	X	--	--	--
	MWD13-2 [0.5-1.0]	07/06/1990	0.5 - 1	X	--	--	X	X	--	--	--	--	X	--
	MWD13-2 [1.5-2.0]	07/06/1990	1.5 - 2	X	X	--	--	--	X	--	--	--	--	--
	MWD13-2 [2.0-2.5]	07/06/1990	2 - 2.5	--	--	--	X	X	--	X	--	--	X	--
	MWD13-2 [3.5-4.0]	07/27/1990	3.5 - 4	--	--	--	--	--	X	--	--	--	--	--
	MWD13-2 [5.0-5.5]	07/27/1990	5 - 5.5	--	X	--	--	--	--	--	--	--	--	--
	MWD13-2 [8.5-9.0]	07/27/1990	8.5 - 9	X	X	--	--	--	--	--	--	--	--	--
	MWD13-2 [9.0-9.5]	07/06/1990	9 - 9.5	--	--	--	X	X	--	X	--	--	X	--
	MWD13-2 [13.0-13.5]	07/27/1990	13 - 13.5	X	X	--	--	--	--	--	--	--	--	--
	MWD13-2 [13.5-14.0]	07/06/1990	13.5 - 14	--	--	--	X	X	--	X	--	--	X	--
MWD13-3	MWD13-2 [14.5-15.0]	07/06/1990	14.5 - 15	--	X	--	--	--	--	--	--	--	--	--
	MWD13-3 [0.5-1.0]	07/06/1990	0.5 - 1	X	--	--	X	X	--	--	--	--	X	--
	MWD13-3 [2.0-2.5]	07/27/1990	2 - 2.5	--	--	--	--	--	X	--	--	--	--	--
	MWD13-3 [3.5-4.0]	07/27/1990	3.5 - 4	--	X	--	--	--	--	--	--	--	--	--
	MWD13-3 [4.0-4.5]	07/06/1990	4 - 4.5	X	X	--	--	--	--	--	--	--	--	--
	MWD13-3 [5.0-5.5]	07/06/1990	5 - 5.5	--	--	--	X	X	--	X	--	--	X	--
	MWD13-3 [11.5-12.0]	07/06/1990	11.5 - 12	X	X	--	--	--	--	--	--	--	--	--
	MWD13-3 [12.0-12.5]	07/27/1990	12 - 12.5	--	--	--	X	--	--	--	--	--	--	--
	MWD13-3 [14.0-14.5]	07/06/1990	14 - 14.5	X	X	--	--	--	--	--	--	--	--	--
	MWD13-3 [14.5-15.0]	07/27/1990	14.5 - 15	--	--	--	X	--	--	--	--	--	--	--
Follow-on Investigation, 1994														
B19-17	280-S19-001	08/22/1994	1 - 2	X	--	--	--	--	X	X	--	--	X	--
	280-S19-002	08/22/1994	2.5 - 3.5	X	X	--	--	--	X	X	--	--	X	--
	280-S19-003	08/22/1994	5 - 6	X	X	--	--	--	X	X	--	--	X	--
B19-18	280-S19-004	08/22/1994	1 - 2	X	--	--	--	--	X	X	--	--	X	--
	280-S19-005	08/22/1994	2 - 3	X	X	--	--	--	X	X	--	--	X	--
	280-S19-006	08/22/1994	4.5 - 5.5	X	X	--	--	--	X	X	--	--	X	--
B19-19	280-S19-008	08/22/1994	1 - 2	--	--	--	--	--	X	X	--	--	X	--
	280-S19-009	08/22/1994	2.5 - 3.5	--	X	--	--	--	X	X	--	--	X	--
	280-S19-010	08/22/1994	5 - 6	--	X	--	--	--	X	X	--	--	X	--
M19-05	280-S19-011	11/06/1994	0.5 - 1.5	X	X	--	--	--	X	X	--	--	X	--
	280-S19-012	11/06/1994	2.5 - 3.5	X	X	--	--	--	X	X	--	--	X	--
	280-S19-013	11/06/1994	4.5 - 5.5	X	X	--	--	--	X	X	--	--	X	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										Organic Lead
				SVOC	VOC	PAH	Pesticides/PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	
PAH Study, 2003														
C3S019B001	C0591045	7/31/2003	0 - 0.5	--	--	X								
	C0591046	7/31/2003	0.5 - 2	--	--	X								
	C0591047	7/31/2003	2 - 4	--	--	X								
	C0591048	7/31/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B002	C0591049	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591050	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591051	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591052	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B003	C0591053	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591055	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591056	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591057	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B004	C0591058	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591059	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591060	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591061	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B005	C0591062	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591063	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591065	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591066	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B006	C0591067	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591068	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591069	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591070	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B007	C0591071	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591072	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591073	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591075	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B008	C0591076	7/31/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591077	7/31/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591078	7/31/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591079	7/31/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B009	C0591080	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591081	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591082	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591083	8/1/2003	4 - 8		--	X	--	--	--	--	--	--	--	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										
				SVOC	VOC	PAH	Pesticides/PCB	Total Metals	General Chemistry	TPH	Herbicides	Tin	Cyanide	Organic Lead
PAH Study, 2003 (Continued)														
C3S019B010	C0591085	7/31/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591086	7/31/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591087	7/31/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591088	7/31/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B011	C0591089	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591090	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591091	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591092	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B012	C0591093	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591095	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591096	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591097	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
C3S019B013	C0591098	8/1/2003	0 - 0.5	--	--	X	--	--	--	--	--	--	--	--
	C0591099	8/1/2003	0.5 - 2	--	--	X	--	--	--	--	--	--	--	--
	C0591100	8/1/2003	2 - 4	--	--	X	--	--	--	--	--	--	--	--
	C0591101	8/1/2003	4 - 8	--	--	X	--	--	--	--	--	--	--	--
ENVIRONMENTAL BASELINE SURVEY														
Phase IIA Environmental Baseline Survey														
134-IW-005	134I-005	01/05/1995	7 - 7.5	X	X	--	X	X	X	X	X	X	--	X
	134I-005M	01/05/1995	7 - 7.5	--	X	--	--	X	--	--	--	--	--	--
134-SN-003	134S-003	01/25/1995	3 - 3.5	X	--	--	--	--	X	--	--	--	--	--
	134S-003M	01/25/1995	3 - 3.5	--	X	--	--	X	--	X	--	--	--	--
134-SS-003	134M-003	02/09/1995	7.5 - 8	X	--	--	X	--	X	--	--	X	--	X
	134M-003M	02/09/1995	7.5 - 8	--	X	--	--	X	--	X	--	--	--	--
134-Z22-025	134-0025	04/05/1995	2.5 - 3	X	--	--	--	--	X	--	--	--	--	--
	134-0025M	04/05/1995	2.5 - 3	--	--	--	X	X	--	X	--	--	--	--
210-IW-004	210I-004	02/14/1995	4 - 4.5	X	X	--	X	X	X	X	X	X	--	X
	210I-004M	02/14/1995	4 - 4.5	--	X	--	--	X	--	--	--	--	--	--
Phase IIB Environmental Baseline Survey														
134-006-041	134-0071	10/13/1995	3 - 4	X	X	--	X	--	X	X	--	--	--	--
	134-0072	10/13/1995	5.5 - 6.5	X	X	--	X	--	X	X	--	--	--	--

TABLE 7-1: SITE 19 SOIL SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED										
				Pesticides/				Total	General		Organic			
				SVOC	VOC	PAH	PCB	Metals	Chemistry	TPH	Herbicides	Tin	Cyanide	Lead
TOTAL PETROLEUM HYDROCARBON INVESTIGATIONS														
Fuel Line and Underground Storage Tank Investigations														
372-1-MOJ	372-P1	09/02/1997	6	--	X	--	--	--	--	X	--	--	--	--
372-2-MOJ	372-P2	09/02/1997	5.5	--	X	--	--	--	--	X	--	--	--	--
372-MW2	372-MW2	01/20/1995	3.5	--	X	--	--	--	--	X	--	--	--	--
REMOVAL ACTIONS														
Basewide Fuel Line Removal Action Confirmation Sampling														
030-S19-005	030-S19-005	10/22/1998	0 - 3	X	X	--	X	X	X	X	--	--	--	--
030-S19-007	030-S19-007	10/22/1998	0 - 2.5	X	X	--	X	X	X	X	--	--	--	--

Notes:

--	These analyses were not performed.
ft bgs	Feet below ground surface
General chemistry	Percent moisture, flashpoint, major anions, TKN, reactivity, TOC, and/or pH
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
SVOC	Semivolatile organic compound
TKN	Total Kjeldahl nitrogen
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound
X	These analyses were performed.

TABLE 7-2: SITE 19 GROUNDWATER SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED									
				SVOC	VOC	Dissolved Metals	Total Metals	Pesticides/ PCBs	General Chemistry	TPH	Landfill Gases	Cyanide	PAH
CERCLA INVESTIGATIONS													
Phases 1 & 2A Investigation, 1991													
MWD13-1	MWD13-1 [08/09/90]	10/18/1990		X	X	X	--	X	X	X	--	X	--
MWD13-2	MWD13-2 [08/09/90]	08/09/1990		X	X	X	--	X	X	X	--	--	--
MWD13-3	MWD13-3 [08/10/90]	10/18/1990		X	X	X	--	X	X	--	--	X	--
MWD13-4	MWD13-4 [08/10/90]	10/17/1990		X	X	X	--	X	X	--	--	X	--
Follow-on Investigation, 1994													
D19-01	280-S19-060	12/16/1994		X	X	X	--	X	X	X	--	--	--
	280-S19-061	03/01/1995		X	X	X	--	--	X	--	--	X	--
	280-S19-062	06/30/1995		X	X	X	--	--	X	--	--	--	--
	280-S19-063	09/15/1995		X	X	X	--	--	X	--	--	--	--
DHP-S19-01	280-S19-038	08/01/1994	19	X	X	X	--	--	X	X	--	--	--
DHP-S19-02	280-S19-039	08/01/1994	22	X	X	X	--	--	X	X	--	--	--
DHP-S19-03	280-S19-041	09/01/1994	20.5	X	X	X	--	--	X	X	--	--	--
DHP-S19-04	280-S19-042	08/18/1994	21.3	X	X	X	--	--	X	X	--	--	--
DHP-S19-05	280-S19-043	08/18/1994	10 - 13	--	--	--	--	--	--	X	--	--	--
M19-05	280-S19-033	12/13/1994		X	X	X	--	X	X	X	--	X	--
	280-S19-035	03/02/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-036	06/29/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-037	08/21/1995		X	X	X	--	--	X	X	--	X	--
MWD13-1	280-S19-016	10/25/1994		X	X	X	--	X	X	X	--	X	--
	280-S19-017	02/28/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-018	06/29/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-019	08/18/1995		X	X	X	--	--	X	X	--	X	--
MWD13-2	280-S19-021	10/24/1994		X	X	X	--	X	X	X	--	X	--
	280-S19-022	03/01/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-023	06/30/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-024	08/18/1995		X	X	X	--	--	X	X	--	X	--
MWD13-3	280-S19-025	10/25/1994		X	X	X	--	X	X	X	--	X	--
	280-S19-026	02/28/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-027	06/29/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-028	08/21/1995		X	X	X	--	--	X	X	--	X	--

TABLE 7-2: SITE 19 GROUNDWATER SAMPLING SUMMARY

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED									
				SVOC	VOC	Dissolved Metals	Total Metals	Pesticides/PCBs	General Chemistry	TPH	Landfill Gases	Cyanide	PAH
Follow-on Investigation, 1994 (Continued)													
MWD13-4	280-S19-029	10/25/1994		X	X	X	--	X	X	X	--	X	--
	280-S19-030	03/01/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-031	06/29/1995		X	X	X	--	--	X	X	--	X	--
	280-S19-032	08/21/1995		X	X	X	--	--	X	X	--	X	--
SHP-S19-01	280-S19-057	09/01/1994	10 - 13	--	--	--	--	--	--	X	--	--	--
SHP-S19-02	280-S19-058	08/30/1994	6.5 - 10	--	--	--	--	--	--	X	--	--	--
SHP-S19-03	280-S19-059	08/30/1994	6.5 - 10	--	--	--	--	--	--	X	--	--	--
Follow-on Investigation, 1998													
D19-01	108-S04-045	05/08/1998		--	X	X	--	--	X	X	--	--	--
	108-S19-004	08/06/1998		--	X	--	X	--	X	X	--	--	--
MWD13-2	108-S04-046	05/06/1998		--	X	X	--	--	X	X	--	--	--
	108-S19-005	08/10/1998		--	X	--	X	--	X	X	--	--	--
MWD13-3	108-S19-001	11/10/1997		--	X	X	--	--	X	X	--	--	--
	108-S19-002	02/12/1998		--	X	X	--	--	X	X	--	--	--
	108-S19-003	05/13/1998		--	X	X	--	--	X	X	--	--	--
	108-S19-006	08/11/1998		--	X	--	X	--	X	X	--	--	--
Supplemental Remedial Investigation Data Gap Sampling, 2001													
D19-01	385-S19-006	07/03/2001		X	X	--	--	--	--	X	--	--	X
M19-05	385-S19-005	07/02/2001		X	X	--	--	--	--	X	--	--	X
MWD13-1	385-S19-001	07/02/2001		X	X	--	--	--	--	X	--	--	X
MWD13-2	385-S19-002	07/02/2001		X	X	--	--	--	--	X	--	--	X
MWD13-3	385-S19-003	07/02/2001		X	X	--	--	--	--	X	--	--	X
MWD13-4	385-S19-004	07/02/2001		X	X	--	--	--	--	X	--	--	X
Basewide Groundwater Monitoring, 2002													
D19-01	D19-01-A1085	07/12/2002		--	X	X	--	--	X	X	X	--	--
	D19-01-A1586	12/11/2002		--	X	X	--	--	X	X	X	--	--
MWD13-3	MWD13-3-A1157	06/19/2002		--	X	X	--	--	X	X	X	--	--
	MWD13-3-A1658	12/18/2002		--	X	X	--	--	X	X	X	--	--
MWD13-4	MWD13-4-A1158	06/19/2002		--	X	X	--	--	X	X	X	--	--
	MWD13-4-A1349	09/05/2002		--	X	--	--	--	--	X	--	--	--
	MWD13-4-A1659	12/16/2002		--	X	X	--	--	X	X	X	--	--
	MWD13-4-A2001	04/10/2003		--	X	--	--	--	--	X	--	--	--

TABLE 7-2: SITE 19 GROUNDWATER SAMPLING SUMMARY

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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SAMPLE LOCATION	SAMPLE IDENTIFICATION	DATE SAMPLED	DEPTH (ft bgs)	ANALYSES PERFORMED									
				SVOC	VOC	Dissolved Metals	Total Metals	Pesticides/PCBs	General Chemistry	TPH	Landfill Gases	Cyanide	PAH
ENVIRONMENTAL BASELINE SURVEY													
Phase IIB Environmental Baseline Survey													
134-006-041	134-0070	10/13/1995	8 - 9	X	X	--	--	X	--	X	--	--	--
TOTAL PETROLEUM HYDROCARBON INVESTIGATION													
Fuel Line and Underground Storage Tank Investigations													
372-1-MOJ	372-P1	09/02/1997		--	X	--	--	--	--	X	--	--	--
372-2-MOJ	372-P2	09/02/1997		--	X	--	--	--	--	X	--	--	--
372-MW2	372-MW2	02/07/1995	2.6 - 12.6	--	X	--	--	--	--	X	--	--	--
	372-MW2	12/17/1997	2.6 - 12.6	--	X	--	--	--	--	X	--	--	--
	372-MW2	03/17/1998	2.6 - 12.6	--	X	--	--	--	--	X	--	--	--
	372-MW2	09/28/1998	2.6 - 12.6	--	X	--	--	--	--	X	--	--	--
	372-MW2	04/02/1999	2.6 - 12.6	--	X	--	--	--	--	X	--	--	--

Notes:

--	These analyses were not performed.
ft bgs	Feet below ground surface
General chemistry	Acidity, alkalinity, major anions, conductivity, hardness, MBAS, oxydation, pH, TDS, sulfide, and/or TOC
MBAS	Methylene blue active substances (surfactant)
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
SVOC	Semivolatile organic carbon
TDS	Total dissolved solids
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
VOC	Volatile organic carbon
X	These analyses were performed.

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
1,1,1-TRICHLOROETHANE	75	2	3	2	1J	3 J	5	680	0	0	1,200,000
1,1,2,2-TETRACHLOROETHANE	71	0	0	--	--	--	5	1,400	0	1	410
1,1,2-TRICHLOROETHANE	71	0	0	--	--	--	5	680	0	0	730
1,1-DICHLOROETHANE	75	1	1	1	1J	1 J	5	680	0	0	2,800 (CAL-modified)
1,1-DICHLOROETHENE	71	0	0	--	--	--	5	680	0	0	120,000
1,2-DICHLOROBENZENE	43	0	0	--	--	--	5	680	0	0	370,000
1,2-DICHLOROETHANE	71	0	0	--	--	--	5	680	0	1	280
1,2-DICHLOROETHENE (TOTAL)	71	0	0	--	--	--	5	680	0	0	43,000 (cis)
1,2-DICHLOROPROPANE	71	0	0	--	--	--	5	680	0	1	340
1,3-DICHLOROBENZENE	47	1	2	590	590J	590 J	5	520	0	0	16,000
1,4-DICHLOROBENZENE	43	0	0	--	--	--	5	680	0	0	3,400
2-BUTANONE	75	1	1	4	4J	4 J	10	1,400	--	--	NA
2-CHLOROETHYLVINYLETHER	48	0	0	--	--	--	6	1,400	--	--	NA
2-HEXANONE	71	0	0	--	--	--	10	1,400	--	--	NA
4-METHYL-2-PENTANONE	71	0	0	--	--	--	5	1,400	--	--	NA
ACETONE	73	6	8	18	4J	37	10	1,400	0	0	1,600,000
BENZENE	71	0	0	--	--	--	5	680	0	1	600
BROMODICHLOROMETHANE	71	0	0	--	--	--	5	680	0	0	820
BROMOFORM	71	0	0	--	--	--	5	680	0	0	62,000
BROMOMETHANE	71	0	0	--	--	--	10	1,400	0	0	3,900
CARBON DISULFIDE	75	0	0	--	--	--	5	680	0	0	360,000
CARBON TETRACHLORIDE	71	0	0	--	--	--	5	680	0	1	250
CHLOROBENZENE	71	0	0	--	--	--	5	680	0	0	150,000
CHLOROETHANE	71	0	0	--	--	--	10	1,400	0	0	3,000
CHLOROFORM	71	0	0	--	--	--	5	680	0	0	940 (CAL-modified)
CHLOROMETHANE	71	0	0	--	--	--	10	1,400	0	1	1,200
CIS-1,3-DICHLOROPROPENE	71	0	0	--	--	--	5	680	0	0	780 (not cis)
DIBROMOCHLOROMETHANE	71	0	0	--	--	--	5	680	0	0	1,100
ETHYLBENZENE	75	2	3	7	6	8	5	680	0	0	8,900
METHYLENE CHLORIDE	73	6	8	14	4	30	8	1,400	0	0	9,100
STYRENE	71	0	0	--	--	--	5	680	0	0	1,700,000

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Phases 1 and 2A Investigation, 1991

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
TETRACHLOROETHENE	75	2	3	3	2J	4 J	5	680	0	0	1,500
TOLUENE	75	74	99	50	2J	1,000	6	6	0	0	520,000
TRANS-1,3-DICHLOROPROPENE	71	0	0	--	--	--	5	680	0	0	780 (not trans)
TRICHLOROETHENE	75	1	1	4	4J	4 J	5	680	0	1	53
TRICHLOROFLUOROMETHANE	48	0	0	--	--	--	5	680	0	0	390,000
VINYL ACETATE	71	0	0	--	--	--	10	1,400	0	0	430,000
VINYL CHLORIDE	71	0	0	--	--	--	10	1,400	0	1	79 (child or adult)
XYLENE (TOTAL)	75	6	8	54	3J	190 J	5	11	0	0	270,000
Semivolatile Organic Compounds (µg/kg)											
1,2,4-TRICHLOROBENZENE	57	0	0	--	--	--	340	6,800	0	0	650,000
1,2-DICHLOROBENZENE	56	0	0	--	--	--	340	6,800	0	0	370,000
1,2-DIPHENYLHYDRAZINE	37	0	0	--	--	--	340	6,800	0	15	610
1,3-DICHLOROBENZENE	56	0	0	--	--	--	340	6,800	0	0	16,000
1,4-DICHLOROBENZENE	56	0	0	--	--	--	340	6,800	0	1	3,400
2,4,5-TRICHLOROPHENOL	57	0	0	--	--	--	1,600	33,000	0	0	6,100,000
2,4,6-TRICHLOROPHENOL	57	0	0	--	--	--	340	6,800	0	0	6,900 (CAL-modified)
2,4-DICHLOROPHENOL	57	0	0	--	--	--	340	6,800	0	0	180,000
2,4-DIMETHYLPHENOL	57	0	0	--	--	--	340	6,800	0	0	1,200,000
2,4-DINITROPHENOL	57	0	0	--	--	--	1,600	33,000	0	0	120,000
2,4-DINITROTOLUENE	57	0	0	--	--	--	340	6,800	0	0	120,000
2,6-DINITROTOLUENE	57	0	0	--	--	--	340	6,800	0	0	61,000
2-CHLORONAPHTHALENE	57	0	0	--	--	--	340	6,800	--	--	NA
2-CHLOROPHENOL	57	0	0	--	--	--	340	6,800	0	0	63,000
2-METHYLNAPHTHALENE	57	0	0	--	--	--	340	6,800	--	--	NA
2-METHYLPHENOL	57	0	0	--	--	--	340	6,800	--	--	NA
2-NITROANILINE	57	0	0	--	--	--	1,600	33,000	0	50	1,700
2-NITROPHENOL	57	0	0	--	--	--	340	6,800	--	--	NA
3,3'-DICHLOROBENZIDINE	57	0	0	--	--	--	680	14,000	0	19	1,100
3-NITROANILINE	57	0	0	--	--	--	1,600	33,000	--	--	NA
4,6-DINITRO-2-METHYLPHENOL	57	0	0	--	--	--	1,600	33,000	--	--	NA

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detections Over PRG	Residential PRG
Semivolatile Organic Compounds (µg/kg)											
4-BROMOPHENYL-PHENYLETHER	57	0	0	--	--	--	340	6,800	--	--	NA
4-CHLORO-3-METHYLPHENOL	57	0	0	--	--	--	340	6,800	--	--	NA
4-CHLOROANILINE	57	0	0	--	--	--	340	6,800	0	0	240,000
4-CHLOROPHENYL-PHENYLETHER	57	0	0	--	--	--	340	6,800	--	--	NA
4-METHYLPHENOL	57	0	0	--	--	--	340	6,800	0	0	310,000
4-NITROANILINE	57	0	0	--	--	--	1,600	33,000	--	--	NA
4-NITROPHENOL	57	0	0	--	--	--	1,600	33,000	--	--	NA
ACENAPHTHENE	57	0	0	--	--	--	340	6,800	0	0	3,700,000
ACENAPHTHYLENE	58	0	0	--	--	--	340	6,800	--	--	NA
ANILINE	17	0	0	--	--	--	380	6,800	0	0	85,000
ANTHRACENE	57	3	5	98	95J	100 J	340	6,800	0	0	22,000,000
BENZO(A)ANTHRACENE	57	5	9	250	72J	540 J	340	6,800	0	15	620
BENZO(A)PYRENE	57	3	5	340	140J	600	340	6,800	3	54	62
BENZO(B)FLUORANTHENE	57	5	9	360	83J	920	340	6,800	1	14	620
BENZO(G,H,I)PERYLENE	57	1	2	390	390J	390 J	340	6,800	--	--	NA
BENZO(K)FLUORANTHENE	57	1	2	170	170J	170 J	340	6,800	0	42	380 (CAL-modified)
BENZOIC ACID	57	0	0	--	--	--	1,600	33,000	0	0	100,000,000
BENZYL ALCOHOL	57	0	0	--	--	--	340	6,800	0	0	18,000,000
BIS(2-CHLOROETHOXY)METHANE	57	0	0	--	--	--	340	6,800	--	--	NA
BIS(2-CHLOROETHYL)ETHER	58	0	0	--	--	--	340	6,800	0	58	210
BIS(2-ETHYLHEXYL)PHTHALATE	57	3	5	420	110J	890	340	6,800	0	0	35,000
BUTYLBENZYLPHTHALATE	57	0	0	--	--	--	340	6,800	0	0	12,000,000
CHRYSENE	57	4	7	380	150J	640 J	340	6,800	0	1	3,800 (CAL-modified)
DI-N-BUTYLPHTHALATE	57	2	4	6,300	5,200	7,300	340	6,800	--	--	NA
DI-N-OCTYLPHTHALATE	57	0	0	--	--	--	340	6,800	--	--	NA
DIBENZO(A,H)ANTHRACENE	57	0	0	--	--	--	340	6,800	0	57	62
DIBENZOFURAN	57	0	0	--	--	--	340	6,800	0	0	290,000
DIETHYLPHTHALATE	57	3	5	7,600	6,200	8,800	340	6,800	0	0	49,000,000
DIMETHYLPHTHALATE	57	0	0	--	--	--	340	6,800	0	0	100,000,000
FLUORANTHENE	57	7	12	420	58J	1,000	340	6,800	0	0	2,300,000
FLUORENE	57	1	2	130	130J	130 J	340	6,800	0	0	2,700,000

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Semivolatile Organic Compounds (µg/kg)											
HEXACHLOROBENZENE	57	0	0	--	--	--	340	6,800	0	57	300
HEXACHLOROBUTADIENE	57	0	0	--	--	--	340	6,800	0	1	6,200
HEXACHLOROCYCLOPENTADIENE	57	0	0	--	--	--	340	6,800	0	0	370,000
HEXACHLOROETHANE	57	0	0	--	--	--	340	6,800	0	0	35,000
INDENO(1,2,3-CD)PYRENE	57	1	2	400	400 J	400 J	340	6,800	0	18	620
ISOPHORONE	57	0	0	--	--	--	340	6,800	0	0	510,000
N-NITROSO-DI-N-PROPYLAMINE	57	0	0	--	--	--	340	6,800	0	57	69
N-NITROSODIMETHYLAMINE	17	0	0	--	--	--	380	6,800	0	17	10
N-NITROSODIPHENYLAMINE	57	18	32	120	44 J	900 J	340	1,700	0	0	99,000
NAPHTHALENE	57	5	9	66	40 J	150 J	340	6,800	0	0	56,000
NITROBENZENE	57	0	0	--	--	--	340	6,800	0	0	20,000
PENTACHLOROPHENOL	57	4	7	830	410 J	1,600 J	1,600	33,000	0	15	3,000
PHENANTHRENE	57	4	7	320	100 J	580 J	340	6,800	--	--	NA
PHENOL	57	0	0	--	--	--	340	6,800	0	0	37,000,000
PYRENE	57	8	14	490	97 J	1,700	340	6,800	0	0	2,300,000
PCBs/Pesticides (µg/kg)											
4,4'-DDD	63	0	0	--	--	--	2	290	0	0	2,400
4,4'-DDE	63	0	0	--	--	--	2	290	0	0	1,700
4,4'-DDT	63	0	0	--	--	--	2	290	0	0	1,700
ALDRIN	63	0	0	--	--	--	1	140	0	3	29
ALPHA-BHC	63	0	0	--	--	--	1	140	--	--	NA
ALPHA-CHLORDANE	30	0	0	--	--	--	3	1,400	0	0	1,600 (chlordanes)
AROCLOR-1016	63	0	0	--	--	--	26	1,400	0	0	3,900
AROCLOR-1221	63	0	0	--	--	--	26	1,600	0	5	220
AROCLOR-1232	63	0	0	--	--	--	26	1,600	0	5	220
AROCLOR-1242	63	0	0	--	--	--	26	1,400	0	5	220
AROCLOR-1248	63	0	0	--	--	--	17	1,400	0	5	220
AROCLOR-1254	63	0	0	--	--	--	17	2,900	0	7	220
AROCLOR-1260	63	0	0	--	--	--	17	2,900	0	7	220
BETA-BHC	63	0	0	--	--	--	1	140	--	--	NA

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
PCBs/Pesticides (µg/kg)											
CHLORDANE	33	0	0	--	--	--	10	210	0	0	1,600
DELTA-BHC	63	0	0	--	--	--	1	140	--	--	NA
DIELDRIN	63	0	0	--	--	--	1	290	0	4	30
ENDOSULFAN I	63	0	0	--	--	--	2	140	0	0	370,000
ENDOSULFAN II	63	0	0	--	--	--	2	290	0	0	370,000 (endosulfan)
ENDOSULFAN SULFATE	63	0	0	--	--	--	2	290	--	--	NA
ENDRIN	63	0	0	--	--	--	2	290	0	0	18,000
ENDRIN ALDEHYDE	33	0	0	--	--	--	2	42	--	--	NA
ENDRIN KETONE	30	0	0	--	--	--	8	290	--	--	NA
GAMMA-BHC (LINDANE)	63	0	0	--	--	--	1	140	--	--	NA
GAMMA-CHLORDANE	30	0	0	--	--	--	3	1,400	0	0	1,600 (chlordan)
HEPTACHLOR	63	0	0	--	--	--	1	140	0	1	110
HEPTACHLOR EPOXIDE	63	0	0	--	--	--	1	140	0	2	53
METHOXYCHLOR	63	0	0	--	--	--	5	1,400	0	0	310,000
TOXAPHENE	63	0	0	--	--	--	52	2,900	0	5	440
Metals (mg/kg)											
ALUMINUM	59	59	100	8,010	2,740	19,500	0.0	0.0	0	0	76,000
ANTIMONY	59	0	0	--	--	--	1.8	7.5	0	0	31.0
ARSENIC	59	21	36	5.4	2.7	14.0	2.5	13.0	21	38	0.39
BARIUM	59	56	95	73.1	15.3	570	21.0	22.3	0	0	5,400
BERYLLIUM	59	17	29	0.35	0.21	0.40	0.13	1.3	0	0	150
CADMIUM	59	18	31	0.83	0.20	7.4	0.20	1.3	0	0	37.0
CALCIUM	59	59	100	6,870	1,200	99,800	0.0	0.0	--	--	NA
CHROMIUM	59	58	98	35.2	5.8	67.0	30.7	30.7	0	0	210
COBALT	59	37	63	6.8	3.4	11.0	4.2	6.2	0	0	900
COPPER	59	56	95	30.6	5.9	256	5.2	5.3	0	0	3,100
CYANIDE	59	5	8	0.86	0.59	1.6	0.51	1.3	--	--	NA
IRON	59	59	100	12,600	140	32,300	0.0	0.0	3	0	23,000
LEAD	59	15	25	60.6	6.2	385	3.5	6.2	2	0	150 (CAL-modified)
MAGNESIUM	59	58	98	3,230	1,200	13,000	5.1	5.1	--	--	NA

TABLE 7-3: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Metals (mg/kg)											
MANGANESE	59	59	100	195	72.0	897	0.0	0.0	0	0	1,800
MOLYBDENUM	59	2	3	1.5	1.4	1.6	0.31	6.4	0	0	390
NICKEL	59	58	98	35.6	5.5	66.9	18.3	18.3	0	0	1,600
POTASSIUM	59	56	95	915	340	1,600	520	620	--	--	NA
SELENIUM	59	0	0	--	--	--	4.3	13.0	0	0	390
SILVER	59	3	5	0.48	0.32	0.70	0.25	6.4	0	0	390
SODIUM	59	35	59	710	153	1,430	520	640	--	--	NA
THALLIUM	59	1	2	3.3	3.3	3.3	1.4	13.0	0	33	5.2
TITANIUM	59	59	100	450	150	846	0.0	0.0	--	--	NA
VANADIUM	59	59	100	24.5	12.0	48.0	0.0	0.0	0	0	550
ZINC	59	59	100	44.3	14.0	292	0.0	0.0	0	0	23,000

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

BHC Benzene Hexachloride

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

DDT Dichlorodiphenyltrichloroethane

J Estimated value

mg/kg Milligrams per kilogram

NA No PRG available

PCB Polychlorinated biphenyl

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/kg Micrograms per kilogram

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Phases 1 and 2A Investigation, 1991

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
1,1,1-TRICHLOROETHANE	4	0	0	--	--	--	5	5	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	4	0	0	--	--	--	5	5	0	4	0.06	1
1,1,2-TRICHLOROETHANE	4	0	0	--	--	--	5	5	0	4	0.2	5
1,1-DICHLOROETHANE	4	3	75	9	6	12	5	5	3	1	2 (CAL-modified)	5
1,1-DICHLOROETHENE	4	0	0	--	--	--	5	5	0	0	340	6
1,2-DICHLOROETHANE	4	0	0	--	--	--	5	5	0	4	0.1	0.5
1,2-DICHLOROETHENE (TOTAL)	4	1	25	7	7	7	5	5	0	0	61 (cis)	NA
1,2-DICHLOROPROPANE	4	0	0	--	--	--	5	5	0	4	0.2	5
2-BUTANONE	4	0	0	--	--	--	10	10	--	--	NA	NA
2-HEXANONE	4	0	0	--	--	--	10	10	--	--	NA	NA
4-METHYL-2-PENTANONE	4	0	0	--	--	--	10	10	--	--	NA	NA
ACETONE	4	0	0	--	--	--	10	10	0	0	610	NA
BENZENE	4	0	0	--	--	--	5	5	0	4	0.3	1
BROMODICHLOROMETHANE	4	0	0	--	--	--	5	5	0	4	0.2	80
BROMOFORM	4	0	0	--	--	--	5	5	0	0	9	80
BROMOMETHANE	4	0	0	--	--	--	10	10	0	4	9	NA
CARBON DISULFIDE	4	0	0	--	--	--	5	5	0	0	1,000	NA
CARBON TETRACHLORIDE	4	0	0	--	--	--	5	5	0	4	0.2	0.5
CHLOROBENZENE	4	0	0	--	--	--	5	5	0	0	110	70
CHLOROETHANE	4	0	0	--	--	--	10	10	0	4	5	NA
CHLOROFORM	4	0	0	--	--	--	5	5	0	4	0.5 (CAL-modified)	80
CHLOROMETHANE	4	0	0	--	--	--	10	10	0	4	2	NA
CIS-1,3-DICHLOROPROPENE	4	0	0	--	--	--	5	5	0	4	0.4 (not cis)	0.5
DIBROMOCHLOROMETHANE	4	0	0	--	--	--	5	5	0	4	0.1	80
ETHYLBENZENE	4	0	0	--	--	--	5	5	0	4	3	300
METHYLENE CHLORIDE	4	0	0	--	--	--	9	12	0	4	4	NA
STYRENE	4	0	0	--	--	--	5	5	0	0	1,600	100
TETRACHLOROETHENE	4	0	0	--	--	--	5	5	0	4	0.7	5
TOLUENE	4	0	0	--	--	--	5	5	0	0	720	150
TRANS-1,3-DICHLOROPROPENE	4	0	0	--	--	--	5	5	0	4	0.4 (not trans)	0.5
TRICHLOROETHENE	4	0	0	--	--	--	5	5	0	4	0.03	5

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
VINYL ACETATE	4	0	0	--	--	--	5	5	0	0	410	NA
VINYL CHLORIDE	4	0	0	--	--	--	10	10	0	4	0.02 (child or adult)	0.5
XYLENE (TOTAL)	4	0	0	--	--	--	5	5	0	0	210	1,800
Semivolatile Organic Compounds (µg/L)												
1,2,4-TRICHLOROBENZENE	4	0	0	--	--	--	10	10	0	0	190	5
1,2-DICHLOROBENZENE	4	0	0	--	--	--	10	10	0	0	370	600
1,3-DICHLOROBENZENE	4	0	0	--	--	--	10	10	0	4	6	NA
1,4-DICHLOROBENZENE	4	0	0	--	--	--	10	10	0	4	0.5	5
2,4,5-TRICHLOROPHENOL	4	0	0	--	--	--	50	50	0	0	3,600	50
2,4,6-TRICHLOROPHENOL	4	0	0	--	--	--	10	10	0	4	1 (CAL-modified)	NA
2,4-DICHLOROPHENOL	4	0	0	--	--	--	10	10	0	0	110	NA
2,4-DIMETHYLPHENOL	4	0	0	--	--	--	10	10	0	0	730	NA
2,4-DINITROPHENOL	4	0	0	--	--	--	50	50	0	0	73	NA
2,4-DINITROTOLUENE	4	0	0	--	--	--	10	10	0	0	73	NA
2,6-DINITROTOLUENE	4	0	0	--	--	--	10	10	0	0	36	NA
2-CHLORONAPHTHALENE	4	0	0	--	--	--	10	10	--	--	NA	NA
2-CHLOROPHENOL	4	0	0	--	--	--	10	10	0	0	30	NA
2-METHYLNAPHTHALENE	4	0	0	--	--	--	10	10	--	--	NA	NA
2-METHYLPHENOL	4	0	0	--	--	--	10	10	0	0	1,800	NA
2-NITROANILINE	4	0	0	--	--	--	50	50	0	4	1	NA
2-NITROPHENOL	4	0	0	--	--	--	10	10	--	--	NA	NA
3,3'-DICHLOROBENZIDINE	4	0	0	--	--	--	20	20	0	4	0.2	NA
3-NITROANILINE	4	0	0	--	--	--	50	50	--	--	NA	NA
4,6-DINITRO-2-METHYLPHENOL	4	0	0	--	--	--	50	50	--	--	NA	NA
4-BROMOPHENYL-PHENYLETHER	4	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLORO-3-METHYLPHENOL	4	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLOROANILINE	4	0	0	--	--	--	10	10	0	0	150	NA
4-CHLOROPHENYL-PHENYLETHER	4	0	0	--	--	--	10	10	--	--	NA	NA
4-METHYLPHENOL	4	0	0	--	--	--	10	10	0	0	180	NA
4-NITROANILINE	4	0	0	--	--	--	50	50	--	--	NA	NA

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
4-NITROPHENOL	4	0	0	--	--	--	50	50	--	--	NA	NA
ACENAPHTHENE	4	0	0	--	--	--	10	10	0	0	370	NA
ACENAPHTHYLENE	4	0	0	--	--	--	10	10	--	--	NA	NA
ANTHRACENE	4	0	0	--	--	--	10	10	0	0	1,800	NA
BENZO(A)ANTHRACENE	4	0	0	--	--	--	10	10	0	4	0.09	0.1
BENZO(A)PYRENE	4	0	0	--	--	--	10	10	0	4	0.009	0.2
BENZO(B)FLUORANTHENE	4	0	0	--	--	--	10	10	0	4	0.09	NA
BENZO(G,H,I)PERYLENE	4	0	0	--	--	--	10	10	--	--	NA	NA
BENZO(K)FLUORANTHENE	4	0	0	--	--	--	10	10	0	4	0.06 (CAL-modified)	NA
BENZOIC ACID	4	0	0	--	--	--	50	50	0	0	150,000	NA
BENZYL ALCOHOL	4	0	0	--	--	--	10	10	0	0	11,000	NA
BIS(2-CHLOROETHOXY)METHANE	4	0	0	--	--	--	10	10	--	--	NA	NA
BIS(2-CHLOROETHYL)ETHER	4	0	0	--	--	--	10	10	0	4	0.01	NA
BIS(2-ETHYLHEXYL)PHTHALATE	4	0	0	--	--	--	10	10	0	4	5	NA
BUTYLBENZYLPHTHALATE	4	0	0	--	--	--	10	10	0	0	7,300	NA
CHRYSENE	4	0	0	--	--	--	10	10	0	4	0.6 (CAL-modified)	NA
DI-N-BUTYLPHTHALATE	4	0	0	--	--	--	10	10	--	--	NA	NA
DI-N-OCTYLPHTHALATE	4	0	0	--	--	--	10	10	--	--	NA	NA
DIBENZO(A,H)ANTHRACENE	4	0	0	--	--	--	10	10	0	4	0.009	NA
DIBENZOFURAN	4	0	0	--	--	--	10	10	0	0	24	NA
DIETHYLPHTHALATE	4	0	0	--	--	--	10	10	0	0	29,000	NA
DIMETHYLPHTHALATE	4	0	0	--	--	--	10	10	0	0	360,000	NA
FLUORANTHENE	4	0	0	--	--	--	10	10	0	0	1,500	NA
FLUORENE	4	0	0	--	--	--	10	10	0	0	240	NA
HEXACHLOROBENZENE	4	0	0	--	--	--	10	10	0	4	0.04	1
HEXACHLOROBUTADIENE	4	0	0	--	--	--	10	10	0	4	0.9	NA
HEXACHLOROCYCLOPENTADIENE	4	0	0	--	--	--	10	10	0	0	220	NA
HEXACHLOROETHANE	4	0	0	--	--	--	10	10	0	4	5	NA
INDENO(1,2,3-CD)PYRENE	4	0	0	--	--	--	10	10	0	4	0.09	NA
ISOPHORONE	4	0	0	--	--	--	10	10	0	0	71	NA
N-NITROSO-DI-N-PROPYLAMINE	4	0	0	--	--	--	10	10	0	4	0.01	NA

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Phases 1 and 2A Investigation, 1991

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
N-NITROSODIPHENYLAMINE	4	0	0	--	--	--	10	10	0	0	14	NA
NAPHTHALENE	4	0	0	--	--	--	10	10	0	4	6	NA
NITROBENZENE	4	0	0	--	--	--	10	10	0	4	3	NA
PENTACHLOROPHENOL	4	0	0	--	--	--	50	50	0	4	0.6	1
PHENANTHRENE	4	0	0	--	--	--	10	10	--	--	NA	NA
PHENOL	4	0	0	--	--	--	10	10	0	0	22,000	NA
PYRENE	4	0	0	--	--	--	10	10	0	0	180	NA
PCBs/Pesticides (µg/L)												
4,4'-DDD	4	0	0	--	--	--	0.02	0.02	0	0	0.3	NA
4,4'-DDE	4	0	0	--	--	--	0.02	0.02	0	0	0.2	NA
4,4'-DDT	4	1	25	0.04	0.04	0.04	0.02	0.02	0	0	0.2	NA
ALDRIN	4	0	0	--	--	--	0.02	0.02	0	4	0.004	NA
ALPHA-BHC	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
AROCLOR-1016	4	0	0	--	--	--	0.3	0.3	0	0	1	NA
AROCLOR-1221	4	0	0	--	--	--	0.3	0.3	0	4	0.03	NA
AROCLOR-1232	4	0	0	--	--	--	0.3	0.3	0	4	0.03	NA
AROCLOR-1242	4	0	0	--	--	--	0.3	0.3	0	4	0.03	NA
AROCLOR-1248	4	0	0	--	--	--	0.3	0.3	0	4	0.03	NA
AROCLOR-1254	4	0	0	--	--	--	0.5	0.5	0	4	0.03	NA
AROCLOR-1260	4	0	0	--	--	--	0.5	0.5	0	4	0.03	NA
BETA-BHC	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
CHLORDANE	4	0	0	--	--	--	0.3	0.3	0	4	0.2	NA
DELTA-BHC	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
DIELDRIN	4	0	0	--	--	--	0.02	0.02	0	4	0.004	NA
ENDOSULFAN I	4	0	0	--	--	--	0.02	0.02	0	0	220	NA
ENDOSULFAN II	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
ENDOSULFAN SULFATE	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
ENDRIN	4	0	0	--	--	--	0.02	0.02	0	0	11	2
ENDRIN ALDEHYDE	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA
GAMMA-BHC (LINDANE)	4	0	0	--	--	--	0.02	0.02	--	--	NA	NA

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Phases 1 and 2A Investigation, 1991

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
PCBs/Pesticides (µg/L)												
HEPTACHLOR	4	0	0	--	--	--	0.02	0.02	0	4	0.02	0.01
HEPTACHLOR EPOXIDE	4	0	0	--	--	--	0.02	0.02	0	4	0.007	0.01
METHOXYCHLOR	4	0	0	--	--	--	0.05	0.05	0	0	180	30
TOXAPHENE	4	0	0	--	--	--	1	1	0	4	0.06	3
Metals (µg/L)												
Filtered												
ALUMINUM	4	4	100	181,000	15,000	378,000	0.0	0.0	3	0	36,000	NA
ANTIMONY	4	0	0	--	--	--	60.0	60.0	0	4	15.0	6.0
ARSENIC	4	1	25	59.0	59.0	59.0	50.0	100	1	3	0.045	10.0
BARIUM	4	3	75	1,680	830	2,900	200	200	1	0	2,600	1,000
BERYLLIUM	4	1	25	9.0	9.0	9.0	5.0	5.0	0	0	73.0	4.0
CADMIUM	4	1	25	6.0	6.0	6.0	5.0	5.0	0	0	18.0	5.0
CALCIUM	4	4	100	213,000	55,000	645,000	0.0	0.0	--	--	NA	NA
CHROMIUM	4	4	100	497	47.0	1,000	0.0	0.0	--	--	NA	50.0
COBALT	4	3	75	135	84.0	220	50.0	50.0	0	0	730	NA
COPPER	4	3	75	303	160	550	25.0	25.0	0	0	1,500	1,300
CYANIDE	3	0	0	--	--	--	10.0	10.0	0	0	730	150
IRON	4	4	100	231,000	21,000	494,000	0.0	0.0	4	0	11,000	NA
LEAD	4	3	75	276	58.0	560	50.0	50.0	--	--	NA	15.0
MAGNESIUM	4	4	100	115,000	23,000	274,000	0.0	0.0	--	--	NA	NA
MANGANESE	4	4	100	4,590	550	9,400	0.0	0.0	3	0	880	NA
MOLYBDENUM	4	0	0	--	--	--	50.0	50.0	0	0	180	NA
NICKEL	4	4	100	625	190	1,200	0.0	0.0	1	0	730	100
POTASSIUM	4	4	100	34,300	22,000	53,000	0.0	0.0	--	--	NA	NA
SELENIUM	4	3	75	116	98.0	150	50.0	50.0	0	0	180	50.0
SILVER	4	0	0	--	--	--	10.0	10.0	0	0	180	NA
SODIUM	4	4	100	171,000	51,000	325,000	0.0	0.0	--	--	NA	NA
THALLIUM	4	0	0	--	--	--	50.0	50.0	0	4	2.4	2.0
TITANIUM	4	4	100	4,730	510	9,100	0.0	0.0	--	--	NA	NA
VANADIUM	4	3	75	577	340	930	50.0	50.0	3	0	260	NA
ZINC	4	4	100	679	97.0	1,700	0.0	0.0	0	0	11,000	NA

TABLE 7-4: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Phases 1 and 2A Investigation, 1991

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NOTES:

Bold denotes values elevated above the PRG

-- Not detected

BHC Benzene Hexachloride

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

DDT Dichlorodiphenyltrichloroethane

MCL Maximum Contaminant Level

NA No criteria available

PCB Polychlorinated biphenyl

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-5: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES

Follow-on Investigation, 1994

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
1,1,1-TRICHLOROETHANE	9	0	0	--	--	--	10	12	0	0	1,200,000
1,1,2,2-TETRACHLOROETHANE	9	0	0	--	--	--	10	12	0	0	410
1,1,2-TRICHLOROETHANE	9	0	0	--	--	--	10	12	0	0	730
1,1-DICHLOROETHANE	9	0	0	--	--	--	10	12	0	0	2,800 (CAL-modified)
1,1-DICHLOROETHENE	9	0	0	--	--	--	10	12	0	0	120,000
1,2-DICHLOROETHANE	9	0	0	--	--	--	10	12	0	0	280
1,2-DICHLOROETHENE (TOTAL)	9	0	0	--	--	--	10	12	0	0	43,000 (cis)
1,2-DICHLOROPROPANE	9	0	0	--	--	--	10	12	0	0	340
2-BUTANONE	9	0	0	--	--	--	10	12	--	--	NA
2-HEXANONE	9	0	0	--	--	--	10	12	--	--	NA
4-METHYL-2-PENTANONE	9	0	0	--	--	--	10	12	--	--	NA
ACETONE	9	0	0	--	--	--	10	160	0	0	1,600,000
BENZENE	9	0	0	--	--	--	10	12	0	0	600
BROMODICHLOROMETHANE	9	0	0	--	--	--	10	12	0	0	820
BROMOFORM	9	0	0	--	--	--	10	12	0	0	62,000
BROMOMETHANE	9	0	0	--	--	--	10	12	0	0	3,900
CARBON DISULFIDE	9	0	0	--	--	--	10	12	0	0	360,000
CARBON TETRACHLORIDE	9	0	0	--	--	--	10	12	0	0	250
CHLOROBENZENE	9	0	0	--	--	--	10	12	0	0	150,000
CHLOROETHANE	9	0	0	--	--	--	10	12	0	0	3,000
CHLOROFORM	9	0	0	--	--	--	10	12	0	0	940 (CAL-modified)
CHLOROMETHANE	9	0	0	--	--	--	10	12	0	0	1,200
CIS-1,3-DICHLOROPROPENE	9	0	0	--	--	--	10	12	0	0	780 (not cis)
DIBROMOCHLOROMETHANE	9	0	0	--	--	--	10	12	0	0	1,100
ETHYLBENZENE	9	0	0	--	--	--	10	12	0	0	8,900
METHYLENE CHLORIDE	9	0	0	--	--	--	10	12	0	0	9,100
STYRENE	9	0	0	--	--	--	10	12	0	0	1,700,000
TETRACHLOROETHENE	9	0	0	--	--	--	10	12	0	0	1,500
TOLUENE	9	0	0	--	--	--	10	12	0	0	520,000
TRANS-1,3-DICHLOROPROPENE	9	0	0	--	--	--	10	12	0	0	780 (not trans)
TRICHLOROETHENE	9	0	0	--	--	--	10	12	0	0	53

TABLE 7-5: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

Follow-on Investigation, 1994

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
VINYL CHLORIDE	9	0	0	--	--	--	10	12	0	0	79 (child or adult)
XYLENE (TOTAL)	9	0	0	--	--	--	10	12	0	0	270,000
Semivolatile Organic Compounds (µg/kg)											
1,2,4-TRICHLOROBENZENE	9	0	0	--	--	--	340	11,000	0	0	650,000
1,2-DICHLOROBENZENE	9	0	0	--	--	--	340	11,000	0	0	370,000
1,3-DICHLOROBENZENE	9	0	0	--	--	--	340	11,000	0	0	16,000
1,4-DICHLOROBENZENE	9	0	0	--	--	--	340	11,000	0	1	3,400
2,2'-OXYBIS(1-CHLOROPROPANE)	9	0	0	--	--	--	340	11,000	--	--	NA
2,4,5-TRICHLOROPHENOL	9	0	0	--	--	--	820	27,000	0	0	6,100,000
2,4,6-TRICHLOROPHENOL	9	0	0	--	--	--	340	11,000	0	1	6,900 (CAL-modified)
2,4-DICHLOROPHENOL	9	0	0	--	--	--	340	11,000	0	0	180,000
2,4-DIMETHYLPHENOL	9	0	0	--	--	--	340	11,000	0	0	1,200,000
2,4-DINITROPHENOL	9	0	0	--	--	--	820	27,000	0	0	120,000
2,4-DINITROTOLUENE	9	0	0	--	--	--	340	11,000	0	0	120,000
2,6-DINITROTOLUENE	9	0	0	--	--	--	340	11,000	0	0	61,000
2-CHLORONAPHTHALENE	9	0	0	--	--	--	340	11,000	--	--	NA
2-CHLOROPHENOL	9	1	11	1,500	1,500 J	1,500 J	340	700	0	0	63,000
2-METHYLNAPHTHALENE	9	0	0	--	--	--	340	11,000	--	--	NA
2-METHYLPHENOL	9	0	0	--	--	--	340	11,000	--	--	NA
2-NITROANILINE	9	0	0	--	--	--	820	27,000	0	1	1,700
2-NITROPHENOL	9	0	0	--	--	--	340	11,000	--	--	NA
3,3'-DICHLOROBENZIDINE	9	0	0	--	--	--	340	11,000	0	1	1,100
3-NITROANILINE	9	0	0	--	--	--	820	27,000	--	--	NA
4,6-DINITRO-2-METHYLPHENOL	9	0	0	--	--	--	820	27,000	--	--	NA
4-BROMOPHENYL-PHENYLETHER	9	0	0	--	--	--	340	11,000	--	--	NA
4-CHLORO-3-METHYLPHENOL	9	1	11	1,500	1,500 J	1,500 J	340	700	--	--	NA
4-CHLOROANILINE	9	0	0	--	--	--	340	11,000	0	0	240,000
4-CHLOROPHENYL-PHENYLETHER	9	0	0	--	--	--	340	11,000	--	--	NA
4-METHYLPHENOL	9	0	0	--	--	--	340	11,000	0	0	310,000
4-NITROANILINE	9	0	0	--	--	--	820	27,000	--	--	NA

TABLE 7-5: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Semivolatile Organic Compounds (µg/kg)											
4-NITROPHENOL	9	0	0	--	--	--	820	27,000	--	--	NA
ACENAPHTHENE	9	1	11	1,200	1,200 J	1,200 J	340	700	0	0	3,700,000
ACENAPHTHYLENE	9	0	0	--	--	--	340	11,000	--	--	NA
ANTHRACENE	9	1	11	36	36 J	36 J	340	11,000	0	0	22,000,000
BENZO(A)ANTHRACENE	9	2	22	1,400	57 J	2,700	340	390	1	0	620
BENZO(A)PYRENE	9	1	11	71	71 J	71	340	11,000	1	8	62
BENZO(B)FLUORANTHENE	9	2	22	510	23 J	1,000	340	700	1	1	620
BENZO(G,H,I)PERYLENE	9	0	0	--	--	--	340	11,000	--	--	NA
BENZO(K)FLUORANTHENE	9	0	0	--	--	--	340	11,000	0	3	380 (CAL-modified)
BIS(2-CHLOROETHOXY)METHANE	9	0	0	--	--	--	340	11,000	--	--	NA
BIS(2-CHLOROETHYL)ETHER	9	0	0	--	--	--	340	11,000	0	9	210
BIS(2-ETHYLHEXYL)PHTHALATE	9	0	0	--	--	--	340	11,000	0	0	35,000
BUTYLBENZYLPHTHALATE	9	0	0	--	--	--	340	11,000	0	0	12,000,000
CARBAZOLE	9	0	0	--	--	--	340	11,000	0	0	24,000
CHRYSENE	9	1	11	18	18 J	18 J	340	11,000	0	1	3,800 (CAL-modified)
DI-N-BUTYLPHTHALATE	9	0	0	--	--	--	340	11,000	--	--	NA
DI-N-OCTYLPHTHALATE	9	0	0	--	--	--	340	11,000	--	--	NA
DIBENZO(A,H)ANTHRACENE	9	1	11	670	670 J	670	340	700	1	8	62
DIBENZOFURAN	9	0	0	--	--	--	340	11,000	0	0	290,000
DIETHYLPHTHALATE	9	0	0	--	--	--	340	11,000	0	0	49,000,000
DIMETHYLPHTHALATE	9	0	0	--	--	--	340	11,000	0	0	100,000,000
FLUORANTHENE	9	3	33	100	25 J	200 J	340	11,000	0	0	2,300,000
FLUORENE	9	0	0	--	--	--	340	11,000	0	0	2,700,000
HEXACHLOROBENZENE	9	0	0	--	--	--	340	11,000	0	9	300
HEXACHLOROBUTADIENE	9	0	0	--	--	--	340	11,000	0	1	6,200
HEXACHLOROCYCLOPENTADIENE	9	0	0	--	--	--	340	11,000	0	0	370,000
HEXACHLOROETHANE	9	0	0	--	--	--	340	11,000	0	0	35,000
INDENO(1,2,3-CD)PYRENE	9	1	11	55	55 J	55 J	340	11,000	0	2	620
ISOPHORONE	9	0	0	--	--	--	340	11,000	0	0	510,000
N-NITROSO-DI-N-PROPYLAMINE	9	0	0	--	--	--	340	11,000	0	9	69
N-NITROSODIPHENYLAMINE	9	0	0	--	--	--	340	11,000	0	0	99,000

TABLE 7-5: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Semivolatile Organic Compounds (µg/kg)											
NAPHTHALENE	9	1	11	39	39J	39 J	340	11,000	0	0	56,000
NITROBENZENE	9	0	0	--	--	--	340	11,000	0	0	20,000
PENTACHLOROPHENOL	9	0	0	--	--	--	820	27,000	0	1	3,000
PHENANTHRENE	9	4	44	250	21J	840 J	340	390	--	--	NA
PHENOL	9	0	0	--	--	--	340	11,000	0	0	37,000,000
PYRENE	9	1	11	230	230J	230 J	340	11,000	0	0	2,300,000
Metals (mg/kg)											
CYANIDE	12	0	0	--	--	--	0.49	0.57	--	--	NA

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

J Estimated value

mg/kg Milligrams per kilogram

NA No PRG available

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/kg Micrograms per kilogram

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
1,1,1-TRICHLOROETHANE	28	6	21	2	0.7J	8	1	1	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	28	0	0	--	--	--	1	1	0	28	0.06	1
1,1,2-TRICHLOROETHANE	28	0	0	--	--	--	1	1	0	28	0.2	5
1,1-DICHLOROETHANE	28	18	64	6	1	27	1	1	14	0	2 (CAL-modified)	5
1,1-DICHLOROETHENE	28	2	7	2	2	2	1	1	0	0	340	6
1,2-DICHLOROETHANE	28	1	4	0.7	0.7	0.7	0.5	1	1	27	0.1	0.5
1,2-DICHLOROETHENE (TOTAL)	28	7	25	2	0.7J	3	1	1	0	0	61 (cis)	NA
1,2-DICHLOROPROPANE	28	0	0	--	--	--	1	1	0	28	0.2	5
2-BUTANONE	1	0	0	--	--	--	14	14	--	--	NA	NA
2-HEXANONE	25	0	0	--	--	--	2	2	--	--	NA	NA
4-METHYL-2-PENTANONE	28	0	0	--	--	--	2	2	--	--	NA	NA
ACETONE	2	1	50	38	38J	38J	3	3	0	0	610	NA
BENZENE	28	4	14	1	0.9	2	0.5	1	4	24	0.3	1
BROMODICHLOROMETHANE	28	0	0	--	--	--	1	1	0	28	0.2	80
BROMOFORM	28	0	0	--	--	--	1	1	0	0	9	80
BROMOMETHANE	28	0	0	--	--	--	1	2	0	0	9	NA
CARBON DISULFIDE	28	0	0	--	--	--	1	1	0	0	1,000	NA
CARBON TETRACHLORIDE	28	0	0	--	--	--	0.5	0.5	0	28	0.2	0.5
CHLOROBENZENE	28	0	0	--	--	--	1	1	0	0	110	70
CHLOROETHANE	28	0	0	--	--	--	2	2	0	0	5	NA
CHLOROFORM	28	0	0	--	--	--	1	1	0	28	0.5 (CAL-modified)	80
CHLOROMETHANE	28	0	0	--	--	--	2	2	0	28	2	NA
CIS-1,3-DICHLOROPROPENE	28	0	0	--	--	--	0.5	0.5	0	28	0.4 (not cis)	0.5
DIBROMOCHLOROMETHANE	28	0	0	--	--	--	1	1	0	28	0.1	80
ETHYLBENZENE	28	0	0	--	--	--	1	1	0	0	3	300
METHYLENE CHLORIDE	28	0	0	--	--	--	1	1	0	0	4	NA
STYRENE	28	0	0	--	--	--	1	1	0	0	1,600	100
TETRACHLOROETHENE	28	9	32	4	0.9J	12	1	1	9	19	0.7	5
TOLUENE	28	1	4	5	5	5	1	1	0	0	720	150
TRANS-1,3-DICHLOROPROPENE	28	0	0	--	--	--	0.5	0.5	0	28	0.4 (not trans)	0.5
TRICHLOROETHENE	28	5	18	2	0.7J	4	1	1	5	23	0.03	5

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
VINYL CHLORIDE	28	0	0	--	--	--	0.5	0.5	0	28	0.02 (child or adult)	0.5
XYLENE (TOTAL)	28	1	4	2	2	2	1	1	0	0	210	1,800
Semivolatile Organic Compounds (µg/L)												
1,2,4-TRICHLOROBENZENE	28	0	0	--	--	--	10	10	0	0	190	5
1,2-DICHLOROBENZENE	28	0	0	--	--	--	5	5	0	0	370	600
1,3-DICHLOROBENZENE	28	0	0	--	--	--	5	5	0	0	6	NA
1,4-DICHLOROBENZENE	28	0	0	--	--	--	5	5	0	28	0.5	5
2,2'-OXYBIS(1-CHLOROPROPANE)	28	1	4	1	1J	1J	10	10	--	--	NA	NA
2,4,5-TRICHLOROPHENOL	28	0	0	--	--	--	25	25	0	0	3,600	50
2,4,6-TRICHLOROPHENOL	28	0	0	--	--	--	10	10	0	28	1 (CAL-modified)	NA
2,4-DICHLOROPHENOL	28	0	0	--	--	--	10	10	0	0	110	NA
2,4-DIMETHYLPHENOL	28	0	0	--	--	--	10	10	0	0	730	NA
2,4-DINITROPHENOL	26	0	0	--	--	--	25	25	0	0	73	NA
2,4-DINITROTOLUENE	28	0	0	--	--	--	10	10	0	0	73	NA
2,6-DINITROTOLUENE	28	0	0	--	--	--	10	10	0	0	36	NA
2-CHLORONAPHTHALENE	28	0	0	--	--	--	10	10	--	--	NA	NA
2-CHLOROPHENOL	28	0	0	--	--	--	10	10	0	0	30	NA
2-METHYLNAPHTHALENE	28	0	0	--	--	--	10	10	--	--	NA	NA
2-METHYLPHENOL	28	0	0	--	--	--	10	10	0	0	1,800	NA
2-NITROANILINE	28	0	0	--	--	--	25	25	0	28	1	NA
2-NITROPHENOL	28	0	0	--	--	--	10	10	--	--	NA	NA
3,3'-DICHLOROBENZIDINE	28	0	0	--	--	--	10	10	0	28	0.2	NA
3-NITROANILINE	28	0	0	--	--	--	25	25	--	--	NA	NA
4,6-DINITRO-2-METHYLPHENOL	28	0	0	--	--	--	25	25	--	--	NA	NA
4-BROMOPHENYL-PHENYLETHER	28	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLORO-3-METHYLPHENOL	28	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLOROANILINE	28	0	0	--	--	--	10	10	0	0	150	NA
4-CHLOROPHENYL-PHENYLETHER	28	0	0	--	--	--	10	10	--	--	NA	NA
4-METHYLPHENOL	28	0	0	--	--	--	10	10	0	0	180	NA
4-NITROANILINE	28	0	0	--	--	--	25	25	--	--	NA	NA

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
4-NITROPHENOL	28	0	0	--	--	--	25	25	--	--	NA	NA
ACENAPHTHENE	28	1	4	0.5	0.5J	0.5J	10	10	0	0	370	NA
ACENAPHTHYLENE	28	0	0	--	--	--	10	10	--	--	NA	NA
ANTHRACENE	28	0	0	--	--	--	10	10	0	0	1,800	NA
BENZO(A)ANTHRACENE	28	0	0	--	--	--	10	10	0	28	0.09	0.1
BENZO(A)PYRENE	28	0	0	--	--	--	10	10	0	28	0.009	0.2
BENZO(B)FLUORANTHENE	28	0	0	--	--	--	10	10	0	28	0.09	NA
BENZO(G,H,I)PERYLENE	28	0	0	--	--	--	10	10	--	--	NA	NA
BENZO(K)FLUORANTHENE	28	0	0	--	--	--	10	10	0	28	0.06 (CAL-modified)	NA
BIS(2-CHLOROETHOXY)METHANE	28	0	0	--	--	--	10	10	--	--	NA	NA
BIS(2-CHLOROETHYL)ETHER	28	0	0	--	--	--	10	10	0	28	0.01	NA
BIS(2-ETHYLHEXYL)PHTHALATE	28	1	4	180	180	180	4	10	1	5	5	NA
BUTYLBENZYLPHthalATE	28	0	0	--	--	--	10	10	0	0	7,300	NA
CARBAZOLE	28	0	0	--	--	--	10	10	0	28	3	NA
CHRYSENE	28	0	0	--	--	--	10	10	0	28	0.6 (CAL-modified)	NA
DI-N-BUTYLPHthalATE	28	0	0	--	--	--	10	10	--	--	NA	NA
DI-N-OCTYLPHthalATE	28	0	0	--	--	--	10	10	--	--	NA	NA
DIBENZO(A,H)ANTHRACENE	28	0	0	--	--	--	10	10	0	28	0.009	NA
DIBENZOFURAN	28	0	0	--	--	--	10	10	0	0	24	NA
DIETHYLPHthalATE	28	0	0	--	--	--	10	10	0	0	29,000	NA
DIMETHYLPHthalATE	28	0	0	--	--	--	10	10	0	0	360,000	NA
FLUORANTHENE	28	1	4	0.6	0.6J	0.6J	10	10	0	0	1,500	NA
FLUORENE	28	0	0	--	--	--	10	10	0	0	240	NA
HEXACHLOROBENZENE	28	0	0	--	--	--	10	10	0	28	0.04	1
HEXACHLOROBUTADIENE	28	0	0	--	--	--	10	10	0	28	0.9	NA
HEXACHLOROCYCLOPENTADIENE	28	0	0	--	--	--	10	10	0	0	220	NA
HEXACHLOROETHANE	28	0	0	--	--	--	10	10	0	28	5	NA
INDENO(1,2,3-CD)PYRENE	28	0	0	--	--	--	10	10	0	28	0.09	NA
ISOPHORONE	28	0	0	--	--	--	10	10	0	0	71	NA
N-NITROSO-DI-N-PROPYLAMINE	28	0	0	--	--	--	10	10	0	28	0.01	NA
N-NITROSODIPHENYLAMINE	28	0	0	--	--	--	10	10	0	0	14	NA

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detections Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
NAPHTHALENE	28	4	14	2	0.8J	2J	10	10	0	24	6	NA
NITROBENZENE	28	0	0	--	--	--	10	10	0	28	3	NA
PENTACHLOROPHENOL	28	0	0	--	--	--	25	25	0	28	0.6	1
PHENANTHRENE	28	2	7	0.7	0.5J	0.8J	10	10	--	--	NA	NA
PHENOL	28	0	0	--	--	--	10	10	0	0	22,000	NA
PYRENE	28	2	7	0.7	0.5J	0.8J	10	10	0	0	180	NA
PCBs/Pesticides (µg/L)												
4,4'-DDD	6	0	0	--	--	--	0.1	0.1	0	0	0.3	NA
4,4'-DDE	6	0	0	--	--	--	0.1	0.1	0	0	0.2	NA
4,4'-DDT	6	0	0	--	--	--	0.1	0.1	0	0	0.2	NA
ALDRIN	6	0	0	--	--	--	0.05	0.05	0	6	0.004	NA
ALPHA-BHC	6	0	0	--	--	--	0.05	0.05	--	--	NA	NA
ALPHA-CHLORDANE	6	0	0	--	--	--	0.05	0.05	0	0	0.2 (chlordanes)	NA
AROCLOR-1016	6	0	0	--	--	--	0.5	0.5	0	0	1	NA
AROCLOR-1221	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
AROCLOR-1232	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
AROCLOR-1242	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
AROCLOR-1248	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
AROCLOR-1254	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
AROCLOR-1260	6	0	0	--	--	--	0.5	0.5	0	6	0.03	NA
BETA-BHC	6	0	0	--	--	--	0.05	0.05	--	--	NA	NA
DELTA-BHC	6	0	0	--	--	--	0.05	0.05	--	--	NA	NA
DIELDRIN	6	0	0	--	--	--	0.1	0.1	0	6	0.004	NA
ENDOSULFAN I	6	0	0	--	--	--	0.05	0.05	0	0	220	NA
ENDOSULFAN II	6	0	0	--	--	--	0.1	0.1	--	--	NA	NA
ENDOSULFAN SULFATE	6	0	0	--	--	--	0.1	0.1	--	--	NA	NA
ENDRIN	6	0	0	--	--	--	0.1	0.1	0	0	11	2
ENDRIN ALDEHYDE	6	0	0	--	--	--	0.1	0.1	--	--	NA	NA
ENDRIN KETONE	6	0	0	--	--	--	0.1	0.1	--	--	NA	NA
GAMMA-BHC (LINDANE)	6	0	0	--	--	--	0.05	0.05	--	--	NA	NA

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
PCBs/Pesticides (µg/L)												
GAMMA-CHLORDANE	6	0	0	--	--	--	0.05	0.05	0	0	0.2 (chlordane)	NA
HEPTACHLOR	6	0	0	--	--	--	0.05	0.05	0	6	0.02	0.01
HEPTACHLOR EPOXIDE	6	0	0	--	--	--	0.01	0.01	0	6	0.007	0.01
METHOXYCHLOR	6	0	0	--	--	--	0.5	0.5	0	0	180	30
TOXAPHENE	6	0	0	--	--	--	3	3	0	6	0.06	3
Metals (µg/L)												
Filtered												
ALUMINUM	28	2	7	407	385	429	8.4	81.9	0	0	36,000	NA
ANTIMONY	28	3	11	7.5	4.0J	12.6J	2.2	28.0	0	3	15.0	6.0
ARSENIC	28	6	21	7.7	3.2J	11.1	2.6	50.0	6	22	0.045	10.0
BARIUM	28	22	79	88.8	15.0J	293	12.6	52.0	0	0	2,600	1,000
BERYLLIUM	28	3	11	1.5	1.1J	2.1J	0.10	2.5	0	0	73.0	4.0
CADMIUM	28	5	18	1.3	0.36J	2.4J	0.30	4.0	0	0	18.0	5.0
CALCIUM	28	28	100	153,000	24,300J	694,000	0.0	0.0	--	--	NA	NA
CHROMIUM	28	6	21	4.9	1.0J	19.4J	0.40	16.0	--	--	NA	50.0
COBALT	28	4	14	10.3	8.5J	13.9J	3.8	11.2	0	0	730	NA
COPPER	28	2	7	11.0	7.2J	14.7J	2.5	18.7	0	0	1,500	1,300
CYANIDE	21	0	0	--	--	--	1.1	9.5	0	0	730	150
IRON	28	8	29	201	10.1J	572	3.2	100	0	0	11,000	NA
LEAD	28	2	7	4.1	2.9J	5.3	1.0	10.0	--	--	NA	15.0
MAGNESIUM	28	25	89	181,000	96.6J	780,000	13.2	128	--	--	NA	NA
MANGANESE	28	24	86	2,890	5.9J	10,200	0.90	1.9	13	0	880	NA
MERCURY	28	0	0	--	--	--	0.20	0.20	0	0	11.0	2.0
MOLYBDENUM	28	2	7	9.0	8.2J	9.8J	7.9	16.2	0	0	180	NA
NICKEL	28	11	39	20.9	11.2J	27.9J	7.5	27.7	0	0	730	100
POTASSIUM	28	26	93	11,700	2,600J	20,800	2,210	3,750	--	--	NA	NA
SELENIUM	28	3	11	3.1	2.7J	3.5J	2.4	27.0	0	0	180	50.0
SILVER	27	0	0	--	--	--	0.90	10.0	0	0	180	NA
SODIUM	28	28	100	620,000	20,800	2,890,000J	0.0	0.0	--	--	NA	NA
THALLIUM	28	1	4	3.6	3.6J	3.6J	2.3	38.0	1	23	2.4	2.0
VANADIUM	28	2	7	18.8	15.8J	21.8J	3.7	18.6	0	0	260	NA

TABLE 7-6: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Follow-on Investigation, 1994

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Metals (µg/L)												
Filtered												
ZINC	28	7	25	112	11.6J	587	5.3	33.7	0	0	11,000	NA

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

BHC Benzene Hexachloride

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

DDT Dichlorodiphenyltrichloroethane

J Estimated value

MCL Maximum Contaminant Level

NA No criteria available

PCB Polychlorinated biphenyl

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-7: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Follow-on Investigation, 1998

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
1,1,1-TRICHLOROETHANE	8	2	25	1	1J	1J	1	1	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	8	0	0	--	--	--	1	1	0	8	0.06	1
1,1,2-TRICHLOROETHANE	8	0	0	--	--	--	1	1	0	8	0.2	5
1,1-DICHLOROETHANE	8	5	63	4	1	6J	1	1	3	0	2 (CAL-modified)	5
1,1-DICHLOROETHENE	8	0	0	--	--	--	1	1	0	0	340	6
1,2,4-TRICHLOROBENZENE	8	0	0	--	--	--	1	1	0	0	190	5
1,2-DIBROMO-3-CHLOROPROPANE	8	0	0	--	--	--	1	1	0	8	0.002 (CAL-modified)	0.2
1,2-DICHLOROBENZENE	8	0	0	--	--	--	1	1	0	0	370	600
1,2-DICHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.1	0.5
1,2-DICHLOROPROPANE	8	0	0	--	--	--	1	1	0	8	0.2	5
1,3-DICHLOROBENZENE	8	0	0	--	--	--	1	1	0	0	6	NA
1,4-DICHLOROBENZENE	8	0	0	--	--	--	1	1	0	8	0.5	5
2-HEXANONE	5	0	0	--	--	--	5	5	--	--	NA	NA
4-METHYL-2-PENTANONE	8	0	0	--	--	--	5	5	--	--	NA	NA
BENZENE	8	0	0	--	--	--	0.5	0.5	0	8	0.3	1
BROMOCHLOROMETHANE	8	0	0	--	--	--	1	1	--	--	NA	NA
BROMODICHLOROMETHANE	8	0	0	--	--	--	1	1	0	8	0.2	80
BROMOFORM	8	0	0	--	--	--	1	1	0	0	9	80
BROMOMETHANE	8	0	0	--	--	--	1	1	0	0	9	NA
CARBON DISULFIDE	8	0	0	--	--	--	1	1	0	0	1,000	NA
CARBON TETRACHLORIDE	8	0	0	--	--	--	0.5	0.5	0	8	0.2	0.5
CHLOROBENZENE	8	0	0	--	--	--	1	1	0	0	110	70
CHLOROETHANE	8	0	0	--	--	--	1	1	0	0	5	NA
CHLOROFORM	8	0	0	--	--	--	1	1	0	8	0.5 (CAL-modified)	80
CHLOROMETHANE	8	0	0	--	--	--	1	1	0	0	2	NA
CIS-1,2-DICHLOROETHENE	8	0	0	--	--	--	1	1	0	0	61	6
CIS-1,3-DICHLOROPROPENE	8	0	0	--	--	--	0.5	0.5	0	8	0.4 (not cis)	0.5
DIBROMOCHLOROMETHANE	8	0	0	--	--	--	1	1	0	8	0.1	80
ETHYLBENZENE	8	0	0	--	--	--	1	1	0	0	3	300
ETHYLENE DIBROMIDE	8	0	0	--	--	--	1	1	--	--	NA	0.05
METHYLENE CHLORIDE	8	0	0	--	--	--	2	2	0	0	4	NA

TABLE 7-7: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Follow-on Investigation, 1998

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
STYRENE	8	0	0	--	--	--	1	1	0	0	1,600	100
TETRACHLOROETHENE	8	0	0	--	--	--	1	1	0	8	0.7	5
TOLUENE	8	0	0	--	--	--	1	1	0	0	720	150
TRANS-1,2-DICHLOROETHENE	8	0	0	--	--	--	1	1	0	0	120	10
TRANS-1,3-DICHLOROPROPENE	8	0	0	--	--	--	0.5	0.5	0	8	0.4 (not trans)	0.5
TRICHLOROETHENE	8	0	0	--	--	--	1	1	0	8	0.03	5
VINYL CHLORIDE	8	0	0	--	--	--	0.5	0.5	0	8	0.02 (child or adult)	0.5
XYLENE (TOTAL)	8	0	0	--	--	--	1	1	0	0	210	1,800
Metals (µg/L)												
Filtered												
ALUMINUM	5	1	20	281	281	281	32.4	81.5	0	0	36,000	NA
ANTIMONY	5	0	0	--	--	--	0.70	1.8	0	0	15.0	6.0
ARSENIC	5	1	20	2.3	2.3J	2.3J	1.0	1.2	1	4	0.045	10.0
BARIUM	5	4	80	161	29.3J	306	266	266	0	0	2,600	1,000
BERYLLIUM	5	0	0	--	--	--	0.10	0.15	0	0	73.0	4.0
CADMIUM	5	3	60	2.2	0.20J	5.5J	0.15	0.26	0	0	18.0	5.0
CALCIUM	5	4	80	196,000	29,000	689,000	16,600	16,600	--	--	NA	NA
CHROMIUM	5	2	40	0.71	0.22J	1.2J	0.35	0.40	--	--	NA	50.0
COBALT	5	1	20	0.51	0.51J	0.51J	0.25	0.40	0	0	730	NA
COPPER	5	0	0	--	--	--	0.35	4.2	0	0	1,500	1,300
IRON	5	3	60	161	76.8	316	5.6	20.3	0	0	11,000	NA
LEAD	5	0	0	--	--	--	0.65	6.9	--	--	NA	15.0
MAGNESIUM	5	3	60	251,000	5,080	741,000	5,510	6,090	--	--	NA	NA
MANGANESE	5	5	100	246	13.3	1,050	0.0	0.0	1	0	880	NA
MERCURY	5	0	0	--	--	--	0.10	0.10	0	0	11.0	2.0
MOLYBDENUM	5	3	60	1.3	0.56J	1.9J	1.8	3.8	0	0	180	NA
NICKEL	5	4	80	7.9	2.2J	21.8	2.1	2.1	0	0	730	100
POTASSIUM	5	5	100	12,500	3,240	29,000J	0.0	0.0	--	--	NA	NA
SELENIUM	3	0	0	--	--	--	0.85	1.0	0	0	180	50.0
SILVER	5	1	20	0.43	0.43J	0.43J	0.15	0.35	0	0	180	NA
SODIUM	5	5	100	428,000	14,900	1,990,000	0.0	0.0	--	--	NA	NA

TABLE 7-7: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Follow-on Investigation, 1998

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Metals (µg/L)												
Filtered												
THALLIUM	5	0	0	--	--	--	0.90	1.4	0	0	2.4	2.0
VANADIUM	5	0	0	--	--	--	0.25	3.0	0	0	260	NA
ZINC	5	2	40	147	35.2	259	3.8	83.9	0	0	11,000	NA

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

J Estimated value

MCL Maximum Contaminant Level

NA No criteria available

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-8: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Supplemental Remedial Investigation Data Gap Sampling, 2001

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
1,1,1-TRICHLOROETHANE	6	1	17	0.6	0.6J	0.6J	2	2	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	6	0	0	--	--	--	1	1	0	6	0.06	1
1,1,2-TRICHLOROETHANE	6	0	0	--	--	--	2	2	0	6	0.2	5
1,1-DICHLOROETHANE	6	4	67	4	0.5J	9	0.5	0.5	2	0	2 (CAL-modified)	5
1,1-DICHLOROETHENE	6	1	17	0.4	0.4J	0.4J	2	2	0	0	340	6
1,2-DICHLOROBENZENE	6	0	0	--	--	--	2	2	0	0	370	600
1,2-DICHLOROETHANE	6	0	0	--	--	--	0.5	0.5	0	6	0.1	0.5
1,2-DICHLOROETHENE (TOTAL)	6	3	50	3	0.3J	8	2	2	0	0	61 (cis)	NA
1,2-DICHLOROPROPANE	6	1	17	2	2	2	2	2	1	5	0.2	5
1,3-DICHLOROBENZENE	6	0	0	--	--	--	2	2	0	0	6	NA
1,4-DICHLOROBENZENE	6	0	0	--	--	--	2	2	0	6	0.5	5
2-BUTANONE	6	1	17	0.7	0.7J	0.7J	2	2	--	--	NA	NA
2-HEXANONE	6	0	0	--	--	--	2	2	--	--	NA	NA
4-METHYL-2-PENTANONE	6	0	0	--	--	--	2	2	--	--	NA	NA
ACETONE	6	0	0	--	--	--	3	3	0	0	610	NA
BENZENE	6	1	17	0.3	0.3J	0.3J	0.5	0.5	0	5	0.3	1
BROMODICHLOROMETHANE	6	0	0	--	--	--	2	2	0	6	0.2	80
BROMOFORM	6	0	0	--	--	--	2	2	0	0	9	80
BROMOMETHANE	6	0	0	--	--	--	2	2	0	0	9	NA
CARBON DISULFIDE	6	0	0	--	--	--	2	2	0	0	1,000	NA
CARBON TETRACHLORIDE	6	0	0	--	--	--	0.5	0.5	0	6	0.2	0.5
CHLOROBENZENE	6	0	0	--	--	--	2	2	0	0	110	70
CHLOROETHANE	6	0	0	--	--	--	2	2	0	0	5	NA
CHLOROFORM	6	0	0	--	--	--	2	2	0	6	0.5 (CAL-modified)	80
CHLOROMETHANE	6	0	0	--	--	--	2	2	0	6	2	NA
CIS-1,3-DICHLOROPROPENE	6	0	0	--	--	--	0.5	0.5	0	6	0.4 (not cis)	0.5
DIBROMOCHLOROMETHANE	6	0	0	--	--	--	2	2	0	6	0.1	80
ETHYLBENZENE	6	0	0	--	--	--	2	2	0	0	3	300
METHYL-T-BUTYL ETHER	6	0	0	--	--	--	5	5	0	0	6 (CAL-modified)	13
METHYLENE CHLORIDE	6	0	0	--	--	--	2	2	0	0	4	NA
STYRENE	6	0	0	--	--	--	2	2	0	0	1,600	100

TABLE 7-8: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Supplemental Remedial Investigation Data Gap Sampling, 2001

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
TETRACHLOROETHENE	6	1	17	7	7	7	2	2	1	5	0.7	5
TOLUENE	6	0	0	--	--	--	2	2	0	0	720	150
TRANS-1,3-DICHLOROPROPENE	6	0	0	--	--	--	0.5	0.5	0	6	0.4 (not trans)	0.5
TRICHLOROETHENE	6	2	33	1	0.7J	2J	2	2	2	4	0.03	5
VINYL CHLORIDE	6	0	0	--	--	--	0.5	0.5	0	6	0.02 (child or adult)	0.5
XYLENE (TOTAL)	6	0	0	--	--	--	2	2	0	0	210	1,800
Semivolatile Organic Compounds (µg/L)												
1,2,4-TRICHLOROBENZENE	6	0	0	--	--	--	10	10	0	0	190	5
1,2-DICHLOROBENZENE	6	0	0	--	--	--	5	5	0	0	370	600
1,3-DICHLOROBENZENE	6	0	0	--	--	--	5	5	0	0	6	NA
1,4-DICHLOROBENZENE	6	0	0	--	--	--	5	5	0	6	0.5	5
2,2'-OXYBIS(1-CHLOROPROPANE)	6	0	0	--	--	--	10	10	--	--	NA	NA
2,4,5-TRICHLOROPHENOL	6	0	0	--	--	--	25	25	0	0	3,600	50
2,4,6-TRICHLOROPHENOL	6	0	0	--	--	--	10	10	0	6	1 (CAL-modified)	NA
2,4-DICHLOROPHENOL	6	0	0	--	--	--	10	10	0	0	110	NA
2,4-DIMETHYLPHENOL	6	0	0	--	--	--	10	10	0	0	730	NA
2,4-DINITROPHENOL	6	0	0	--	--	--	50	50	0	0	73	NA
2,4-DINITROTOLUENE	6	0	0	--	--	--	10	10	0	0	73	NA
2,6-DINITROTOLUENE	6	0	0	--	--	--	10	10	0	0	36	NA
2-CHLORONAPHTHALENE	6	0	0	--	--	--	10	10	--	--	NA	NA
2-CHLOROPHENOL	6	0	0	--	--	--	10	10	0	0	30	NA
2-METHYLNAPHTHALENE	6	0	0	--	--	--	10	10	--	--	NA	NA
2-METHYLPHENOL	6	0	0	--	--	--	10	10	0	0	1,800	NA
2-NITROANILINE	6	0	0	--	--	--	25	25	0	6	1	NA
2-NITROPHENOL	6	0	0	--	--	--	10	10	--	--	NA	NA
3,3'-DICHLOROBENZIDINE	6	0	0	--	--	--	12	12	0	6	0.2	NA
3-NITROANILINE	6	0	0	--	--	--	25	25	--	--	NA	NA
4,6-DINITRO-2-METHYLPHENOL	6	0	0	--	--	--	25	25	--	--	NA	NA
4-BROMOPHENYL-PHENYLETHER	6	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLORO-3-METHYLPHENOL	6	0	0	--	--	--	10	10	--	--	NA	NA

TABLE 7-8: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Supplemental Remedial Investigation Data Gap Sampling, 2001

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
4-CHLOROANILINE	6	0	0	--	--	--	17	17	0	0	150	NA
4-CHLOROPHENYL-PHENYLETHER	6	0	0	--	--	--	10	10	--	--	NA	NA
4-METHYLPHENOL	6	0	0	--	--	--	10	10	0	0	180	NA
4-NITROANILINE	6	0	0	--	--	--	25	25	--	--	NA	NA
4-NITROPHENOL	6	0	0	--	--	--	25	25	--	--	NA	NA
ACENAPHTHENE	6	0	0	--	--	--	10	10	0	0	370	NA
ACENAPHTHYLENE	6	0	0	--	--	--	10	10	--	--	NA	NA
ANTHRACENE	6	0	0	--	--	--	10	10	0	0	1,800	NA
BENZO(A)ANTHRACENE	6	0	0	--	--	--	10	10	0	6	0.09	0.1
BENZO(A)PYRENE	6	0	0	--	--	--	1	1	0	6	0.009	0.2
BENZO(B)FLUORANTHENE	6	0	0	--	--	--	10	10	0	6	0.09	NA
BENZO(G,H,I)PERYLENE	6	0	0	--	--	--	10	10	--	--	NA	NA
BENZO(K)FLUORANTHENE	6	0	0	--	--	--	10	10	0	6	0.06 (CAL-modified)	NA
BIS(2-CHLOROETHOXY)METHANE	6	0	0	--	--	--	10	10	--	--	NA	NA
BIS(2-CHLOROETHYL)ETHER	6	0	0	--	--	--	10	10	0	6	0.01	NA
BIS(2-ETHYLHEXYL)PHTHALATE	6	0	0	--	--	--	4	4	0	0	5	NA
BUTYLBENZYLPHTHALATE	6	0	0	--	--	--	10	10	0	0	7,300	NA
CARBAZOLE	6	0	0	--	--	--	10	10	0	6	3	NA
CHRYSENE	6	0	0	--	--	--	10	10	0	6	0.6 (CAL-modified)	NA
DI-N-BUTYLPHTHALATE	6	0	0	--	--	--	10	10	--	--	NA	NA
DI-N-OCTYLPHTHALATE	6	0	0	--	--	--	10	10	--	--	NA	NA
DIBENZO(A,H)ANTHRACENE	6	0	0	--	--	--	20	20	0	6	0.009	NA
DIBENZOFURAN	6	0	0	--	--	--	10	10	0	0	24	NA
DIETHYLPHTHALATE	6	0	0	--	--	--	10	10	0	0	29,000	NA
DIMETHYLPHTHALATE	6	0	0	--	--	--	10	10	0	0	360,000	NA
FLUORANTHENE	6	0	0	--	--	--	10	10	0	0	1,500	NA
FLUORENE	6	0	0	--	--	--	10	10	0	0	240	NA
HEXACHLOROBENZENE	6	0	0	--	--	--	10	10	0	6	0.04	1
HEXACHLOROBUTADIENE	6	0	0	--	--	--	10	10	0	6	0.9	NA
HEXACHLOROCYCLOPENTADIENE	6	0	0	--	--	--	11	11	0	0	220	NA
HEXACHLOROETHANE	6	0	0	--	--	--	10	10	0	6	5	NA

TABLE 7-8: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Supplemental Remedial Investigation Data Gap Sampling, 2001

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Semivolatile Organic Compounds (µg/L)												
INDENO(1,2,3-CD)PYRENE	6	0	0	--	--	--	10	10	0	6	0.09	NA
ISOPHORONE	6	0	0	--	--	--	10	10	0	0	71	NA
N-NITROSO-DI-N-PROPYLAMINE	6	0	0	--	--	--	10	10	0	6	0.01	NA
N-NITROSODIPHENYLAMINE	6	0	0	--	--	--	10	10	0	0	14	NA
NAPHTHALENE	6	0	0	--	--	--	10	10	0	6	6	NA
NITROBENZENE	6	0	0	--	--	--	10	10	0	6	3	NA
PENTACHLOROPHENOL	6	0	0	--	--	--	25	25	0	6	0.6	1
PHENANTHRENE	6	0	0	--	--	--	10	10	--	--	NA	NA
PHENOL	6	0	0	--	--	--	10	10	0	0	22,000	NA
PYRENE	6	0	0	--	--	--	10	10	0	0	180	NA
Polynuclear Aromatic Hydrocarbons (µg/L)												
ACENAPHTHENE	6	0	0	--	--	--	5	5	0	0	370	NA
ACENAPHTHYLENE	6	0	0	--	--	--	2	2	--	--	NA	NA
ANTHRACENE	6	1	17	0.1	0.1J	0.1J	0.2	0.2	0	0	1,800	NA
BENZO(A)ANTHRACENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	0.1
BENZO(A)PYRENE	6	0	0	--	--	--	0.2	0.2	0	6	0.009	0.2
BENZO(B)FLUORANTHENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	NA
BENZO(G,H,I)PERYLENE	6	0	0	--	--	--	0.2	0.2	--	--	NA	NA
BENZO(K)FLUORANTHENE	6	0	0	--	--	--	0.2	0.2	0	6	0.06 (CAL-modified)	NA
CHRYSENE	6	0	0	--	--	--	0.2	0.2	0	0	0.6 (CAL-modified)	NA
DIBENZO(A,H)ANTHRACENE	6	0	0	--	--	--	0.5	0.5	0	6	0.009	NA
FLUORANTHENE	6	2	33	0.2	0.1J	0.2J	0.2	0.2	0	0	1,500	NA
FLUORENE	6	1	17	0.7	0.7J	0.7J	1	1	0	0	240	NA
INDENO(1,2,3-CD)PYRENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	NA
NAPHTHALENE	6	1	17	4	4J	4J	5	5	0	0	6	NA
PHENANTHRENE	6	1	17	0.8	0.8J	0.8J	1	1	--	--	NA	NA
PYRENE	6	4	67	0.1	0.1J	0.2J	0.2	0.2	0	0	180	NA

TABLE 7-8: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Supplemental Remedial Investigation Data Gap Sampling, 2001

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

J Estimated value

MCL Maximum Contaminant Level

NA No criteria available

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-9: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Basewide Groundwater Monitoring, 2002 and 2003

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
1,1,1,2-TETRACHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.4	NA
1,1,1-TRICHLOROETHANE	8	6	75	2	0.8	3	0.5	0.5	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.06	1
1,1,2-TRICHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.2	5
1,1-DICHLOROETHANE	8	6	75	6	1	10	0.5	0.5	5	0	2 (CAL-modified)	5
1,1-DICHLOROETHENE	8	4	50	0.3	0.2J	0.4J	0.5	0.5	0	0	340	6
1,1-DICHLOROPROPENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,2,3-TRICHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,2,3-TRICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	0	8	0.006	NA
1,2,4-TRICHLOROBENZENE	8	1	13	0.1	0.1J	0.1J	0.5	0.5	0	0	190	5
1,2,4-TRIMETHYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	12	NA
1,2-DIBROMO-3-CHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	0	8	0.002 (CAL-modified)	0.2
1,2-DICHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	370	600
1,2-DICHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.1	0.5
1,2-DICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	0	8	0.2	5
1,3,5-TRIMETHYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	12	NA
1,3-DICHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	6	NA
1,3-DICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,4-DICHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	0.5	5
2,2-DICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
2-BUTANONE	8	0	0	--	--	--	10	10	--	--	NA	NA
2-CHLOROTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
2-HEXANONE	8	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLOROTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
4-METHYL-2-PENTANONE	8	0	0	--	--	--	10	10	--	--	NA	NA
ACETONE	8	1	13	1	1J	1J	0.5	10	0	0	610	NA
BENZENE	8	3	38	0.2	0.2J	0.3J	0.3	0.5	0	4	0.3	1
BROMOBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	20	NA
BROMOCHLOROMETHANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
BROMODICHLOROMETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.2	80
BROMOFORM	8	0	0	--	--	--	1	1	0	0	9	80

TABLE 7-9: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Basewide Groundwater Monitoring, 2002 and 2003

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
BROMOMETHANE	8	0	0	--	--	--	1	1	0	0	9	NA
CARBON DISULFIDE	8	2	25	2	0.4J	4	0.5	0.5	0	0	1,000	NA
CARBON TETRACHLORIDE	8	0	0	--	--	--	0.5	0.5	0	8	0.2	0.5
CHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	110	70
CHLOROETHANE	8	0	0	--	--	--	1	1	0	0	5	NA
CHLOROFORM	8	1	13	0.2	0.2J	0.2J	0.5	0.5	0	0	0.5 (CAL-modified)	80
CHLOROMETHANE	8	0	0	--	--	--	1	1	0	0	2	NA
CIS-1,2-DICHLOROETHENE	8	5	63	2	0.2J	3	0.5	0.5	0	0	61	6
DIBROMOCHLOROMETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.1	80
DIBROMOMETHANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
DICHLORODIFLUOROMETHANE	8	0	0	--	--	--	1	1	0	0	390	NA
DIISOPROPYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
ETHYL TERT-BUTYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
ETHYLBENZENE	8	1	13	0.1	0.1J	0.1J	0.5	0.5	0	0	3	300
ETHYLENE DIBROMIDE	8	0	0	--	--	--	0.5	0.5	--	--	NA	0.05
HEXACHLOROBUTADIENE	8	0	0	--	--	--	0.5	0.5	0	0	0.9	NA
ISOPROPYLBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
M,P-XYLENE	8	1	13	0.4	0.4J	0.4J	0.5	0.5	0	0	210 (xylenes)	NA
METHYL-T-BUTYL ETHER	8	1	13	0.3	0.3J	0.3J	0.2	0.5	0	0	6 (CAL-modified)	13
METHYLENE CHLORIDE	8	0	0	--	--	--	0.2	5	0	4	4	NA
N-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
N-PROPYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
NAPHTHALENE	8	2	25	2	2J	2	2	3	0	0	6	NA
O-XYLENE	8	1	13	0.1	0.1J	0.1J	0.5	0.5	0	0	210 (xylenes)	NA
P-ISOPROPYLTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
SEC-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
STYRENE	8	0	0	--	--	--	0.5	0.5	0	0	1,600	100
TERT-AMYL METHYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
TERT-BUTANOL	8	0	0	--	--	--	10	20	--	--	NA	NA
TERT-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
TETRACHLOROETHENE	8	6	75	12	0.4J	22	0.5	0.5	4	0	0.7	5

TABLE 7-9: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Basewide Groundwater Monitoring, 2002 and 2003

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
TOLUENE	8	1	13	0.4	0.4J	0.4J	0.5	0.5	0	0	720	150
TRANS-1,2-DICHLOROETHENE	8	1	13	0.1	0.1J	0.1J	0.5	0.5	0	0	120	10
TRICHLOROETHENE	8	5	63	3	0.6	4	0.5	0.5	5	3	0.03	5
TRICHLOROFLUOROMETHANE	8	0	0	--	--	--	1	1	--	--	NA	NA
VINYL CHLORIDE	8	0	0	--	--	--	0.5	0.5	0	8	0.02 (child or adult)	0.5
Metals (µg/L)												
Filtered												
ALUMINUM	6	4	67	188	9.8J	380	6.4	11.0	0	0	36,000	NA
ANTIMONY	6	3	50	0.43	0.12J	0.60J	0.068	0.66	0	0	15.0	6.0
ARSENIC	6	4	67	4.2	0.64J	7.6	2.2	4.9	4	2	0.045	10.0
BARIUM	6	5	83	28.3	9.3J	53.0J	41.0	41.0	0	0	2,600	1,000
BERYLLIUM	6	0	0	--	--	--	1.1	2.0	0	0	73.0	4.0
CADMIUM	6	1	17	0.87	0.87J	0.87J	5.0	5.0	0	0	18.0	5.0
CALCIUM	6	6	100	224,000	16,000	630,000J	0.0	0.0	--	--	NA	NA
CHROMIUM	6	3	50	3.4	0.75J	8.6J	0.52	10.0	--	--	NA	50.0
COBALT	6	3	50	1.0	0.046J	2.8J	0.046	3.2	0	0	730	NA
COPPER	6	5	83	1.3	0.31J	3.8J	10.0	10.0	0	0	1,500	1,300
IRON	6	3	50	703	36.0J	2,000	64.0	130	0	0	11,000	NA
LEAD	6	1	17	0.20	0.20J	0.20J	0.035	0.49	--	--	NA	15.0
MAGNESIUM	6	5	83	298,000	14.0J	760,000J	21.0	21.0	--	--	NA	NA
MANGANESE	6	5	83	4,130	0.23J	12,000J	10.0	10.0	2	0	880	NA
MERCURY	6	0	0	--	--	--	0.095	0.20	0	0	11.0	2.0
MOLYBDENUM	6	2	33	3.3	0.89J	5.7J	2.6	20.0	0	0	180	NA
NICKEL	6	4	67	6.1	1.4J	19.0J	20.0	21.0	0	0	730	100
POTASSIUM	6	6	100	8,800	3,500	11,000	0.0	0.0	--	--	NA	NA
SELENIUM	6	4	67	12.8	0.85J	28.0	5.0	5.0	0	0	180	50.0
SILVER	6	0	0	--	--	--	0.078	5.0	0	0	180	NA
SODIUM	6	6	100	1,080,000	30,000	3,200,000	0.0	0.0	--	--	NA	NA
THALLIUM	6	0	0	--	--	--	0.12	2.0	0	0	2.4	2.0
VANADIUM	6	5	83	9.1	1.5J	19.0	10.0	10.0	0	0	260	NA
ZINC	6	4	67	31.1	0.70J	120J	9.7	20.0	0	0	11,000	NA

TABLE 7-9: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

Basewide Groundwater Monitoring, 2002 and 2003

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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NOTES:

Bold denotes values elevated above the PRG

-- Not detected

J Estimated value

MCL Maximum Contaminant Level

NA No criteria available

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-10: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES

Basewide Polynuclear Aromatic Hydrocarbon Investigation, 2003

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Polynuclear Aromatic Hydrocarbons (µg/kg)											
2-METHYLNAPHTHALENE	52	28	54	1	0.3 J	8	0.005	7	--	--	NA
ACENAPHTHENE	52	13	25	0.6	0.002 J	1 J	0.02	7	0	0	3,700
ACENAPHTHYLENE	52	31	60	2	0.004 J	19	0.02	7	--	--	NA
ANTHRACENE	52	33	63	3	0.004 J	47	0.005	7	0	0	22,000
BENZ(A)ANTHRACENE	52	44	85	15	0.005 J	320	0.03	7	--	--	NA
BENZO(A)PYRENE	52	42	81	26	0.002 J	520	0.005	7	34	6	0.06
BENZO(B)FLUORANTHENE	52	43	83	17	0.002 J	280	0.03	7	32	6	0.6
BENZO(G,H,I)PERYLENE	52	46	88	27	0.003 J	400	0.005	6	--	--	NA
BENZO(K)FLUORANTHENE	52	36	69	20	0.008 J	330	0.005	7	32	6	0.4 (CAL-modified)
CHRYSENE	52	48	92	24	0.002 J	420	0.006	5	21	1	4 (CAL-modified)
DIBENZ(A,H)ANTHRACENE	52	26	50	5	0.002 J	40	0.005	7	--	--	NA
FLUORANTHENE	52	47	90	27	0.002 J	640	0.03	6	0	0	2,300
FLUORENE	52	22	42	1	0.2 J	6	0.01	7	0	0	2,700
INDENO(1,2,3-CD)PYRENE	52	44	85	23	0.005 J	470	0.03	6	33	5	0.6
NAPHTHALENE	52	42	81	2	0.001 J	25	0.01	6	0	0	56
PHENANTHRENE	52	42	81	11	0.002 J	170	0.005	5	--	--	NA
PYRENE	52	50	96	32	0.003 J	710	0.03	5	0	0	2,300

NOTES:

Bold denotes values elevated above the PRG

J Estimated value

NA No PRG available

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/kg Micrograms per kilogram

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES

All Soil Investigations

Remedial Investigation Report for Sites 9, 13, 19, 22, and 23, Alameda Point, Alameda, California

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
1,1,1-TRICHLOROETHANE	86	2	2	2	1J	3 J	5	680	0	0	1,200,000
1,1,2,2-TETRACHLOROETHANE	82	0	0	--	--	--	5	1,400	0	1	410
1,1,2-TRICHLOROETHANE	82	0	0	--	--	--	5	680	0	0	730
1,1-DICHLOROETHANE	86	1	1	1	1J	1 J	5	680	0	0	2,800 (CAL-modified)
1,1-DICHLOROETHENE	82	0	0	--	--	--	5	680	0	0	120,000
1,2-DICHLOROBENZENE	43	0	0	--	--	--	5	680	0	0	370,000
1,2-DICHLOROETHANE	82	0	0	--	--	--	5	680	0	1	280
1,2-DICHLOROETHENE (TOTAL)	82	0	0	--	--	--	5	680	0	0	43,000 (cis)
1,2-DICHLOROPROPANE	82	0	0	--	--	--	5	680	0	1	340
1,3-DICHLOROBENZENE	47	1	2	590	590J	590 J	5	520	0	0	16,000
1,4-DICHLOROBENZENE	43	0	0	--	--	--	5	680	0	0	3,400
2-BUTANONE	86	1	1	4	4J	4 J	10	1,400	--	--	NA
2-CHLOROETHYLVINYLETHER	48	0	0	--	--	--	6	1,400	--	--	NA
2-HEXANONE	82	0	0	--	--	--	10	1,400	--	--	NA
4-METHYL-2-PENTANONE	82	0	0	--	--	--	5	1,400	--	--	NA
ACETONE	84	6	7	18	4J	37	10	1,400	0	0	1,600,000
BENZENE	82	0	0	--	--	--	5	680	0	1	600
BROMODICHLOROMETHANE	82	0	0	--	--	--	5	680	0	0	820
BROMOFORM	82	0	0	--	--	--	5	680	0	0	62,000
BROMOMETHANE	82	0	0	--	--	--	10	1,400	0	0	3,900
CARBON DISULFIDE	86	0	0	--	--	--	5	680	0	0	360,000
CARBON TETRACHLORIDE	82	0	0	--	--	--	5	680	0	1	250
CHLOROBENZENE	82	0	0	--	--	--	5	680	0	0	150,000
CHLOROETHANE	82	0	0	--	--	--	10	1,400	0	0	3,000
CHLOROFORM	82	0	0	--	--	--	5	680	0	0	940 (CAL-modified)
CHLOROMETHANE	82	0	0	--	--	--	10	1,400	0	1	1,200
CIS-1,3-DICHLOROPROPENE	82	0	0	--	--	--	5	680	0	0	780 (not cis)
DIBROMOCHLOROMETHANE	82	0	0	--	--	--	5	680	0	0	1,100
ETHYLBENZENE	86	2	2	7	6	8	5	680	0	0	8,900
METHYLENE CHLORIDE	84	6	7	14	4	30	8	1,400	0	0	9,100
STYRENE	82	0	0	--	--	--	5	680	0	0	1,700,000

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Volatile Organic Compounds (µg/kg)											
TETRACHLOROETHENE	86	2	2	3	2J	4 J	5	680	0	0	1,500
TOLUENE	86	74	86	50	2J	1,000	6	12	0	0	520,000
TRANS-1,3-DICHLOROPROPENE	82	0	0	--	--	--	5	680	0	0	780 (not trans)
TRICHLOROETHENE	86	1	1	4	4J	4 J	5	680	0	1	53
TRICHLOROFLUOROMETHANE	48	0	0	--	--	--	5	680	0	0	390,000
VINYL ACETATE	71	0	0	--	--	--	10	1,400	0	0	430,000
VINYL CHLORIDE	82	0	0	--	--	--	10	1,400	0	1	79 (child or adult)
XYLENE (TOTAL)	86	6	7	54	3J	190 J	5	12	0	0	270,000
Semivolatile Organic Compounds (µg/kg)											
1,2,4-TRICHLOROGENE	69	0	0	--	--	--	340	11,000	0	0	650,000
1,2-DICHLOROGENE	68	0	0	--	--	--	340	11,000	0	0	370,000
1,2-DIPHENYLHYDRAZINE	37	0	0	--	--	--	340	6,800	0	15	610
1,3-DICHLOROGENE	68	0	0	--	--	--	340	11,000	0	0	16,000
1,4-DICHLOROGENE	68	0	0	--	--	--	340	11,000	0	2	3,400
2,2'-OXYBIS(1-CHLOROPROPANE)	12	0	0	--	--	--	340	11,000	--	--	NA
2,4,5-TRICHLOROPHENOL	69	0	0	--	--	--	820	33,000	0	0	6,100,000
2,4,6-TRICHLOROPHENOL	69	0	0	--	--	--	340	11,000	0	1	6,900 (CAL-modified)
2,4-DICHLOROPHENOL	69	0	0	--	--	--	340	11,000	0	0	180,000
2,4-DIMETHYLPHENOL	69	0	0	--	--	--	340	11,000	0	0	1,200,000
2,4-DINITROPHENOL	69	0	0	--	--	--	820	33,000	0	0	120,000
2,4-DINITROTOLUENE	69	0	0	--	--	--	340	11,000	0	0	120,000
2,6-DINITROTOLUENE	69	0	0	--	--	--	340	11,000	0	0	61,000
2-CHLORONAPHTHALENE	69	0	0	--	--	--	340	11,000	--	--	NA
2-CHLOROPHENOL	69	1	1	1,500	1,500J	1,500 J	340	6,800	0	0	63,000
2-METHYLPHENOL	69	0	0	--	--	--	340	11,000	--	--	NA
2-NITROANILINE	69	0	0	--	--	--	820	33,000	0	51	1,700
2-NITROPHENOL	69	0	0	--	--	--	340	11,000	--	--	NA
3,3'-DICHLOROBENZIDINE	69	0	0	--	--	--	340	14,000	0	20	1,100
3-NITROANILINE	69	0	0	--	--	--	820	33,000	--	--	NA
4,6-DINITRO-2-METHYLPHENOL	69	0	0	--	--	--	820	33,000	--	--	NA

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Semivolatile Organic Compounds (ug/kg)											
4-BROMOPHENYL-PHENYLETHER	69	0	0	--	--	--	340	11,000	--	--	NA
4-CHLORO-3-METHYLPHENOL	69	1	1	1,500	1,500 J	1,500 J	340	6,800	--	--	NA
4-CHLOROANILINE	69	0	0	--	--	--	340	11,000	0	0	240,000
4-CHLOROPHENYL-PHENYLETHER	69	0	0	--	--	--	340	11,000	--	--	NA
4-METHYLPHENOL	69	0	0	--	--	--	340	11,000	0	0	310,000
4-NITROANILINE	69	0	0	--	--	--	820	33,000	--	--	NA
4-NITROPHENOL	69	0	0	--	--	--	820	33,000	--	--	NA
ANILINE	17	0	0	--	--	--	380	6,800	0	0	85,000
BENZOIC ACID	57	0	0	--	--	--	1,600	33,000	0	0	100,000,000
BENZYL ALCOHOL	57	0	0	--	--	--	340	6,800	0	0	18,000,000
BIS(2-CHLOROETHOXY)METHANE	69	0	0	--	--	--	340	11,000	--	--	NA
BIS(2-CHLOROETHYL)ETHER	70	0	0	--	--	--	340	11,000	0	70	210
BIS(2-ETHYLHEXYL)PHTHALATE	69	3	4	420	110 J	890	340	11,000	0	0	35,000
BUTYLBENZYLPHTHALATE	69	0	0	--	--	--	340	11,000	0	0	12,000,000
CARBAZOLE	12	0	0	--	--	--	340	11,000	0	0	24,000
DI-N-BUTYLPHTHALATE	69	2	3	6,300	5,200	7,300	340	11,000	--	--	NA
DI-N-OCTYLPHTHALATE	69	0	0	--	--	--	340	11,000	--	--	NA
DIBENZOFURAN	69	0	0	--	--	--	340	11,000	0	0	290,000
DIETHYLPHTHALATE	69	4	6	5,700	21 J	8,800	340	11,000	0	0	49,000,000
DIMETHYLPHTHALATE	69	0	0	--	--	--	340	11,000	0	0	100,000,000
HEXACHLOROENZENE	69	0	0	--	--	--	340	11,000	0	69	300
HEXACHLOROBUTADIENE	69	0	0	--	--	--	340	11,000	0	2	6,200
HEXACHLOROCYCLOPENTADIENE	69	0	0	--	--	--	340	11,000	0	0	370,000
HEXACHLOROETHANE	69	0	0	--	--	--	340	11,000	0	0	35,000
ISOPHORONE	69	0	0	--	--	--	340	11,000	0	0	510,000
N-NITROSO-DI-N-PROPYLAMINE	69	0	0	--	--	--	340	11,000	0	69	69
N-NITROSODIMETHYLAMINE	17	0	0	--	--	--	380	6,800	0	17	10
N-NITROSODIPHENYLAMINE	69	18	26	120	44 J	900 J	340	11,000	0	0	99,000
NITROBENZENE	69	0	0	--	--	--	340	11,000	0	0	20,000
PENTACHLOROPHENOL	67	4	6	830	410 J	1,600 J	820	33,000	0	16	3,000
PHENOL	69	0	0	--	--	--	340	11,000	0	0	37,000,000

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detections Over PRG	Residential PRG
Polynuclear Aromatic Hydrocarbons (µg/kg)											
2-METHYLNAPHTHALENE	52	28	54	1	0.3J	8	0.005	7	--	--	NA
ACENAPHTHENE	52	13	25	0.6	0.002J	1 J	0.02	7	0	0	3,700
ACENAPHTHYLENE	52	31	60	2	0.004J	19	0.02	7	--	--	NA
ANTHRACENE	52	33	63	3	0.004J	47	0.005	7	0	0	22,000
BENZ(A)ANTHRACENE	52	44	85	15	0.005J	320	0.03	7	--	--	NA
BENZO(A)PYRENE	52	42	81	26	0.002J	520	0.005	7	34	6	0.06
BENZO(B)FLUORANTHENE	52	43	83	17	0.002J	280	0.03	7	32	6	0.6
BENZO(G,H,I)PERYLENE	52	46	88	27	0.003J	400	0.005	6	--	--	NA
BENZO(K)FLUORANTHENE	52	36	69	20	0.008J	330	0.005	7	32	6	0.4 (CAL-modified)
CHRYSENE	52	48	92	24	0.002J	420	0.006	5	21	1	4 (CAL-modified)
DIBENZ(A,H)ANTHRACENE	52	26	50	5	0.002J	40	0.005	7	--	--	NA
FLUORANTHENE	52	47	90	27	0.002J	640	0.03	6	0	0	2,300
FLUORENE	52	22	42	1	0.2J	6	0.01	7	0	0	2,700
INDENO(1,2,3-CD)PYRENE	52	44	85	23	0.005J	470	0.03	6	33	5	0.6
NAPHTHALENE	52	42	81	2	0.001J	25	0.01	6	0	0	56
PHENANTHRENE	52	42	81	11	0.002J	170	0.005	5	--	--	NA
PYRENE	52	50	96	32	0.003J	710	0.03	5	0	0	2,300
PCBs/Pesticides (µg/kg)											
4,4'-DDD	65	0	0	--	--	--	2	290	0	0	2,400
4,4'-DDE	65	1	2	5	5J	5 J	2	290	0	0	1,700
4,4'-DDT	65	1	2	7	7J	7 J	2	290	0	0	1,700
ALDRIN	65	0	0	--	--	--	1	140	0	3	29
ALPHA-BHC	65	0	0	--	--	--	1	140	--	--	NA
ALPHA-CHLORDANE	32	0	0	--	--	--	2	1,400	0	0	1,600 (chlordanes)
AROCLOR-1016	66	0	0	--	--	--	22	1,400	0	0	3,900
AROCLOR-1221	66	0	0	--	--	--	22	1,600	0	5	220
AROCLOR-1232	66	0	0	--	--	--	22	1,600	0	5	220
AROCLOR-1242	66	0	0	--	--	--	22	1,400	0	5	220
AROCLOR-1248	66	0	0	--	--	--	17	1,400	0	5	220
AROCLOR-1254	66	0	0	--	--	--	17	2,900	0	7	220

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

All Soil Investigations

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
PCBs/Pesticides (µg/kg)											
AROCLOR-1260	66	1	2	23	23	23	17	2,900	0	7	220
BETA-BHC	65	0	0	--	--	--	1	140	--	--	NA
CHLORDANE	33	0	0	--	--	--	10	210	0	0	1,600
DELTA-BHC	65	0	0	--	--	--	1	140	--	--	NA
DIELDRIN	65	0	0	--	--	--	1	290	0	4	30
ENDOSULFAN I	65	0	0	--	--	--	2	140	0	0	370,000
ENDOSULFAN II	65	0	0	--	--	--	2	290	0	0	370,000 (endosulfan)
ENDOSULFAN SULFATE	65	0	0	--	--	--	2	290	--	--	NA
ENDRIN	65	0	0	--	--	--	2	290	0	0	18,000
ENDRIN ALDEHYDE	35	0	0	--	--	--	2	42	--	--	NA
ENDRIN KETONE	32	0	0	--	--	--	3	290	--	--	NA
GAMMA-BHC (LINDANE)	65	0	0	--	--	--	1	140	--	--	NA
GAMMA-CHLORDANE	32	0	0	--	--	--	2	1,400	0	0	1,600 (chlordan)
HEPTACHLOR	65	0	0	--	--	--	1	140	0	1	110
HEPTACHLOR EPOXIDE	65	0	0	--	--	--	1	140	0	2	53
METHOXYCHLOR	65	0	0	--	--	--	5	1,400	0	0	310,000
TOXAPHENE	65	0	0	--	--	--	52	2,900	0	5	440
Metals (mg/kg)											
ALUMINUM	59	59	100	8,010	2,740	19,500	0.0	0.0	0	0	76,000
ANTIMONY	59	0	0	--	--	--	1.8	7.5	0	0	31.0
ARSENIC	59	21	36	5.4	2.7	14.0	2.5	13.0	21	38	0.39
BARIUM	59	56	95	73.1	15.3	570	21.0	22.3	0	0	5,400
BERYLLIUM	59	17	29	0.35	0.21	0.40	0.13	1.3	0	0	150
CADMIUM	59	18	31	0.83	0.20	7.4	0.20	1.3	0	0	37.0
CALCIUM	59	59	100	6,870	1,200	99,800	0.0	0.0	--	--	NA
CHROMIUM	59	58	98	35.2	5.8	67.0	30.7	30.7	0	0	210
COBALT	59	37	63	6.8	3.4	11.0	4.2	6.2	0	0	900
COPPER	59	56	95	30.6	5.9	256	5.2	5.3	0	0	3,100
CYANIDE	71	5	7	0.86	0.59	1.6	0.49	1.3	--	--	NA
IRON	59	59	100	12,600	140	32,300	0.0	0.0	3	0	23,000

TABLE 7-11: SITE 19 STATISTICAL SUMMARY OF SOIL ANALYSES (Continued)

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Residential PRG
Metals (mg/kg)											
LEAD	60	16	27	57.2	6.2	385	3.5	6.2	2	0	150 (CAL-modified)
MAGNESIUM	59	58	98	3,230	1,200	13,000	5.1	5.1	--	--	NA
MANGANESE	59	59	100	195	72.0	897	0.0	0.0	0	0	1,800
MOLYBDENUM	59	2	3	1.5	1.4	1.6	0.31	6.4	0	0	390
NICKEL	59	58	98	35.6	5.5	66.9	18.3	18.3	0	0	1,600
POTASSIUM	59	56	95	915	340	1,600	520	620	--	--	NA
SELENIUM	59	0	0	--	--	--	4.3	13.0	0	0	390
SILVER	59	3	5	0.48	0.32	0.70	0.25	6.4	0	0	390
SODIUM	59	35	59	710	153	1,430	520	640	--	--	NA
THALLIUM	59	1	2	3.3	3.3	3.3	1.4	13.0	0	33	5.2
TITANIUM	59	59	100	450	150	846	0.0	0.0	--	--	NA
VANADIUM	59	59	100	24.5	12.0	48.0	0.0	0.0	0	0	550
ZINC	59	59	100	44.3	14.0	292	0.0	0.0	0	0	23,000

NOTES:

Bold denotes values elevated above the PRG

-- Not detected

BHC Benzene Hexachloride

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

DDT Dichlorodiphenyltrichloroethane

J Estimated value

mg/kg Milligrams per kilogram

NA No PRG available

PCB Polychlorinated biphenyl

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/kg Micrograms per kilogram

TABLE 7-12: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

All Groundwater Investigations

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (ug/L)												
1,1,1,2-TETRACHLOROETHANE	8	0	0	--	--	--	0.5	0.5	0	8	0.4	NA
1,1,1-TRICHLOROETHANE	55	15	27	2	0.6J	8	0.5	5	0	0	3,200	200
1,1,2,2-TETRACHLOROETHANE	55	0	0	--	--	--	0.5	5	0	55	0.06	1
1,1,2-TRICHLOROETHANE	55	0	0	--	--	--	0.5	5	0	55	0.2	5
1,1-DICHLOROETHANE	55	36	65	6	0.5J	27	0.5	5	27	1	2 (CAL-modified)	5
1,1-DICHLOROETHENE	55	7	13	0.8	0.2J	2	0.5	5	0	0	340	6
1,1-DICHLOROPROPENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,2,3-TRICHLOROBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,2,3-TRICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	0	8	0.006	NA
1,2,4-TRICHLOROBENZENE	16	1	6	0.1	0.1J	0.1J	0.5	1	0	0	190	5
1,2,4-TRIMETHYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	12	NA
1,2-DIBROMO-3-CHLOROPROPANE	16	0	0	--	--	--	0.5	1	0	16	0.002 (CAL-modified)	0.2
1,2-DICHLOROBENZENE	22	0	0	--	--	--	0.5	2	0	0	370	600
1,2-DICHLOROETHANE	55	1	2	0.7	0.7	0.7	0.5	5	1	54	0.1	0.5
1,2-DICHLOROETHENE (TOTAL)	39	12	31	3	0.3J	8	1	5	0	0	61 (cis)	NA
1,2-DICHLOROPROPANE	55	1	2	2	2	2	0.5	5	1	54	0.2	5
1,3,5-TRIMETHYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	12	NA
1,3-DICHLOROBENZENE	22	0	0	--	--	--	0.5	2	0	0	6	NA
1,3-DICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
1,4-DICHLOROBENZENE	22	0	0	--	--	--	0.5	2	0	14	0.5	5
2,2-DICHLOROPROPANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
2-BUTANONE	19	1	5	0.7	0.7J	0.7J	2	14	--	--	NA	NA
2-CHLOROTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
2-HEXANONE	49	0	0	--	--	--	2	10	--	--	NA	NA
4-CHLOROTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
4-METHYL-2-PENTANONE	55	0	0	--	--	--	2	10	--	--	NA	NA
ACETONE	21	2	10	20	1J	38J	0.5	10	0	0	610	NA
BENZENE	55	8	15	0.7	0.2J	2	0.3	5	4	46	0.3	1
BROMOBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	20	NA
BROMOCHLOROMETHANE	16	0	0	--	--	--	0.5	1	--	--	NA	NA
BROMODICHLOROMETHANE	55	0	0	--	--	--	0.5	5	0	55	0.2	80

TABLE 7-12: SITE 19 STATISTICAL SUMMARY OF GROUNDWATER ANALYSES

All Groundwater Investigations

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Analyte	Number of Samples Analyzed	Number of Detections	Percent of Detections	Average of Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration	Minimum Non-detected Concentration	Maximum Non-detected Concentration	Number of Detections Over PRG	Number of Non-detects Over PRG	Tap Water PRG	MCL
Volatile Organic Compounds (µg/L)												
BROMOFORM	55	0	0	--	--	--	1	5	0	0	9	80
BROMOMETHANE	55	0	0	--	--	--	1	10	0	4	9	NA
CARBON DISULFIDE	55	2	4	2	0.4J	4	0.5	5	0	0	1,000	NA
CARBON TETRACHLORIDE	55	0	0	--	--	--	0.5	5	0	55	0.2	0.5
CHLOROBENZENE	55	0	0	--	--	--	0.5	5	0	0	110	70
CHLOROETHANE	55	0	0	--	--	--	1	10	0	4	5	NA
CHLOROFORM	55	1	2	0.2	0.2J	0.2J	0.5	5	0	47	0.5 (CAL-modified)	80
CHLOROMETHANE	55	0	0	--	--	--	1	10	0	39	2	NA
CIS-1,2-DICHLOROETHENE	16	5	31	2	0.2J	3	0.5	1	0	0	61	6
CIS-1,3-DICHLOROPROPENE	47	0	0	--	--	--	0.5	5	0	47	0.4 (not cis)	0.5
DIBROMOCHLOROMETHANE	55	0	0	--	--	--	0.5	5	0	55	0.1	80
DIBROMOMETHANE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
DICHLORODIFLUOROMETHANE	8	0	0	--	--	--	1	1	0	0	390	NA
DIISOPROPYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
ETHYL TERT-BUTYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
ETHYLBENZENE	55	1	2	0.1	0.1J	0.1J	0.5	5	0	4	3	300
ETHYLENE DIBROMIDE	16	0	0	--	--	--	0.5	1	--	--	NA	0.05
HEXACHLOROBUTADIENE	8	0	0	--	--	--	0.5	0.5	0	0	0.9	NA
ISOPROPYLBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
M,P-XYLENE	8	1	13	0.4	0.4J	0.4J	0.5	0.5	0	0	210 (xylenes)	NA
METHYL-T-BUTYL ETHER	14	1	7	0.3	0.3J	0.3J	0.2	5	0	0	6 (CAL-modified)	13
METHYLENE CHLORIDE	55	0	0	--	--	--	0.2	12	0	8	4	NA
N-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
N-PROPYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
NAPHTHALENE	8	2	25	2	2J	2	2	3	0	0	6	NA
O-XYLENE	8	1	13	0.1	0.1J	0.1J	0.5	0.5	0	0	210 (xylenes)	NA
P-ISOPROPYLTOLUENE	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
SEC-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
STYRENE	55	0	0	--	--	--	0.5	5	0	0	1,600	100
TERT-AMYL METHYL ETHER	8	0	0	--	--	--	0.5	0.5	--	--	NA	NA
TERT-BUTANOL	8	0	0	--	--	--	10	20	--	--	NA	NA

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Volatile Organic Compounds (µg/L)												
TERT-BUTYLBENZENE	8	0	0	--	--	--	0.5	0.5	0	0	240	NA
TETRACHLOROETHENE	55	16	29	7	0.4J	22	0.5	5	14	37	0.7	5
TOLUENE	55	2	4	3	0.4J	5	0.5	5	0	0	720	150
TRANS-1,2-DICHLOROETHENE	16	1	6	0.1	0.1J	0.1J	0.5	1	0	0	120	10
TRANS-1,3-DICHLOROPROPENE	47	0	0	--	--	--	0.5	5	0	47	0.4 (not trans)	0.5
TRICHLOROETHENE	55	13	24	2	0.6	4	0.5	5	13	42	0.03	5
TRICHLOROFLUOROMETHANE	8	0	0	--	--	--	1	1	--	--	NA	NA
VINYL ACETATE	4	0	0	--	--	--	5	5	0	0	410	NA
VINYL CHLORIDE	55	0	0	--	--	--	0.5	10	0	55	0.02 (child or adult)	0.5
XYLENE (TOTAL)	47	1	2	2	2	2	1	5	0	0	210	1,800
Semivolatile Organic Compounds (µg/L)												
1,2,4-TRICHLOROBENZENE	39	0	0	--	--	--	10	10	0	0	190	5
1,2-DICHLOROBENZENE	39	0	0	--	--	--	5	10	0	0	370	600
1,3-DICHLOROBENZENE	39	0	0	--	--	--	5	10	0	5	6	NA
1,4-DICHLOROBENZENE	39	0	0	--	--	--	5	10	0	39	0.5	5
2,2'-OXYBIS(1-CHLOROPROPANE)	35	1	3	1	1J	1J	10	10	--	--	NA	NA
2,4,5-TRICHLOROPHENOL	39	0	0	--	--	--	25	50	0	0	3,600	50
2,4,6-TRICHLOROPHENOL	39	0	0	--	--	--	10	10	0	39	1 (CAL-modified)	NA
2,4-DICHLOROPHENOL	39	0	0	--	--	--	10	10	0	0	110	NA
2,4-DIMETHYLPHENOL	39	0	0	--	--	--	10	10	0	0	730	NA
2,4-DINITROPHENOL	37	0	0	--	--	--	25	50	0	0	73	NA
2,4-DINITROTOLUENE	39	0	0	--	--	--	10	10	0	0	73	NA
2,6-DINITROTOLUENE	39	0	0	--	--	--	10	10	0	0	36	NA
2-CHLORONAPHTHALENE	39	0	0	--	--	--	10	10	--	--	NA	NA
2-CHLOROPHENOL	39	0	0	--	--	--	10	10	0	0	30	NA
2-METHYLNAPHTHALENE	39	0	0	--	--	--	10	10	--	--	NA	NA
2-METHYLPHENOL	39	0	0	--	--	--	10	10	0	0	1,800	NA
2-NITROANILINE	39	0	0	--	--	--	25	50	0	39	1	NA
2-NITROPHENOL	39	0	0	--	--	--	10	10	--	--	NA	NA
3,3'-DICHLOROBENZIDINE	39	0	0	--	--	--	10	20	0	39	0.2	NA

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Semivolatile Organic Compounds (µg/L)												
3-NITROANILINE	39	0	0	--	--	--	25	50	--	--	NA	NA
4,6-DINITRO-2-METHYLPHENOL	39	0	0	--	--	--	25	50	--	--	NA	NA
4-BROMOPHENYL-PHENYLETHER	39	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLORO-3-METHYLPHENOL	39	0	0	--	--	--	10	10	--	--	NA	NA
4-CHLOROANILINE	39	0	0	--	--	--	10	17	0	0	150	NA
4-CHLOROPHENYL-PHENYLETHER	39	0	0	--	--	--	10	10	--	--	NA	NA
4-METHYLPHENOL	39	0	0	--	--	--	10	10	0	0	180	NA
4-NITROANILINE	39	0	0	--	--	--	25	50	--	--	NA	NA
4-NITROPHENOL	39	0	0	--	--	--	25	50	--	--	NA	NA
ACENAPHTHENE	39	1	3	0.5	0.5J	0.5J	10	10	0	0	370	NA
ACENAPHTHYLENE	39	0	0	--	--	--	10	10	--	--	NA	NA
ANTHRACENE	39	0	0	--	--	--	10	10	0	0	1,800	NA
BENZO(A)ANTHRACENE	39	0	0	--	--	--	10	10	0	39	0.09	0.1
BENZO(A)PYRENE	39	0	0	--	--	--	1	10	0	39	0.009	0.2
BENZO(B)FLUORANTHENE	39	0	0	--	--	--	10	10	0	39	0.09	NA
BENZO(G,H,I)PERYLENE	39	0	0	--	--	--	10	10	--	--	NA	NA
BENZO(K)FLUORANTHENE	39	0	0	--	--	--	10	10	0	39	0.06 (CAL-modified)	NA
BENZOIC ACID	4	0	0	--	--	--	50	50	0	0	150,000	NA
BENZYL ALCOHOL	4	0	0	--	--	--	10	10	0	0	11,000	NA
BIS(2-CHLOROETHOXY)METHANE	39	0	0	--	--	--	10	10	--	--	NA	NA
BIS(2-CHLOROETHYL)ETHER	39	0	0	--	--	--	10	10	0	39	0.01	NA
BIS(2-ETHYLHEXYL)PHTHALATE	39	1	3	180	180	180	4	10	1	10	5	NA
BUTYLBENZYLPHTHALATE	39	0	0	--	--	--	10	10	0	0	7,300	NA
CARBAZOLE	35	0	0	--	--	--	10	10	0	35	3	NA
CHRYSENE	39	0	0	--	--	--	10	10	0	39	0.6 (CAL-modified)	NA
DI-N-BUTYLPHTHALATE	39	0	0	--	--	--	10	10	--	--	NA	NA
DI-N-OCTYLPHTHALATE	39	0	0	--	--	--	10	10	--	--	NA	NA
DIBENZO(A,H)ANTHRACENE	39	0	0	--	--	--	10	20	0	39	0.009	NA
DIBENZOFURAN	39	0	0	--	--	--	10	10	0	0	24	NA
DIETHYLPHTHALATE	39	0	0	--	--	--	10	10	0	0	29,000	NA
DIMETHYLPHTHALATE	39	0	0	--	--	--	10	10	0	0	360,000	NA

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Semivolatile Organic Compounds (µg/L)												
FLUORANTHENE	39	1	3	0.6	0.6J	0.6J	10	10	0	0	1,500	NA
FLUORENE	39	0	0	--	--	--	10	10	0	0	240	NA
HEXACHLOROBENZENE	39	0	0	--	--	--	10	10	0	39	0.04	1
HEXACHLOROBUTADIENE	39	0	0	--	--	--	10	10	0	39	0.9	NA
HEXACHLOROCYCLOPENTADIENE	39	0	0	--	--	--	10	11	0	0	220	NA
HEXACHLOROETHANE	39	0	0	--	--	--	10	10	0	39	5	NA
INDENO(1,2,3-CD)PYRENE	39	0	0	--	--	--	10	10	0	39	0.09	NA
ISOPHORONE	39	0	0	--	--	--	10	10	0	0	71	NA
N-NITROSO-DI-N-PROPYLAMINE	39	0	0	--	--	--	10	10	0	39	0.01	NA
N-NITROSODIPHENYLAMINE	39	0	0	--	--	--	10	10	0	0	14	NA
NAPHTHALENE	39	4	10	2	0.8J	2J	10	10	0	35	6	NA
NITROBENZENE	39	0	0	--	--	--	10	10	0	39	3	NA
PENTACHLOROPHENOL	39	0	0	--	--	--	25	50	0	39	0.6	1
PHENANTHRENE	39	3	8	0.8	0.5J	1J	10	10	--	--	NA	NA
PHENOL	39	0	0	--	--	--	10	10	0	0	22,000	NA
PYRENE	39	3	8	0.8	0.5J	1J	10	10	0	0	180	NA
Polynuclear Aromatic Hydrocarbons (µg/L)												
ACENAPHTHENE	6	0	0	--	--	--	5	5	0	0	370	NA
ACENAPHTHYLENE	6	0	0	--	--	--	2	2	--	--	NA	NA
ANTHRACENE	6	1	17	0.1	0.1J	0.1J	0.2	0.2	0	0	1,800	NA
BENZO(A)ANTHRACENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	0.1
BENZO(A)PYRENE	6	0	0	--	--	--	0.2	0.2	0	6	0.009	0.2
BENZO(B)FLUORANTHENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	NA
BENZO(G,H,I)PERYLENE	6	0	0	--	--	--	0.2	0.2	--	--	NA	NA
BENZO(K)FLUORANTHENE	6	0	0	--	--	--	0.2	0.2	0	6	0.06 (CAL-modified)	NA
CHRYSENE	6	0	0	--	--	--	0.2	0.2	0	0	0.6 (CAL-modified)	NA
DIBENZO(A,H)ANTHRACENE	6	0	0	--	--	--	0.5	0.5	0	6	0.009	NA
FLUORANTHENE	6	2	33	0.2	0.1J	0.2J	0.2	0.2	0	0	1,500	NA
FLUORENE	6	1	17	0.7	0.7J	0.7J	1	1	0	0	240	NA
INDENO(1,2,3-CD)PYRENE	6	0	0	--	--	--	0.2	0.2	0	6	0.09	NA

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Polynuclear Aromatic Hydrocarbons (µg/L)												
NAPHTHALENE	6	1	17	4	4J	4J	5	5	0	0	6	NA
PHENANTHRENE	6	1	17	0.8	0.8J	0.8J	1	1	--	--	NA	NA
PYRENE	6	4	67	0.1	0.1J	0.2J	0.2	0.2	0	0	180	NA
PCBs/Pesticides (µg/L)												
4,4'-DDD	10	0	0	--	--	--	0.02	0.1	0	0	0.3	NA
4,4'-DDE	10	0	0	--	--	--	0.02	0.1	0	0	0.2	NA
4,4'-DDT	10	1	10	0.04	0.04	0.04	0.02	0.1	0	0	0.2	NA
ALDRIN	10	0	0	--	--	--	0.02	0.05	0	10	0.004	NA
ALPHA-BHC	10	0	0	--	--	--	0.02	0.05	--	--	NA	NA
ALPHA-CHLORDANE	6	0	0	--	--	--	0.05	0.05	0	0	0.2 (chlordanes)	NA
AROCLOR-1016	11	0	0	--	--	--	0.3	1	0	1	1	NA
AROCLOR-1221	11	0	0	--	--	--	0.3	2	0	11	0.03	NA
AROCLOR-1232	11	0	0	--	--	--	0.3	1	0	11	0.03	NA
AROCLOR-1242	11	0	0	--	--	--	0.3	1	0	11	0.03	NA
AROCLOR-1248	11	0	0	--	--	--	0.3	1	0	11	0.03	NA
AROCLOR-1254	11	0	0	--	--	--	0.5	1	0	11	0.03	NA
AROCLOR-1260	11	0	0	--	--	--	0.5	1	0	11	0.03	NA
BETA-BHC	10	0	0	--	--	--	0.02	0.05	--	--	NA	NA
CHLORDANE	4	0	0	--	--	--	0.3	0.3	0	4	0.2	NA
DELTA-BHC	10	0	0	--	--	--	0.02	0.05	--	--	NA	NA
DIELDRIN	10	0	0	--	--	--	0.02	0.1	0	10	0.004	NA
ENDOSULFAN I	10	0	0	--	--	--	0.02	0.05	0	0	220	NA
ENDOSULFAN II	10	0	0	--	--	--	0.02	0.1	--	--	NA	NA
ENDOSULFAN SULFATE	10	0	0	--	--	--	0.02	0.1	--	--	NA	NA
ENDRIN	10	0	0	--	--	--	0.02	0.1	0	0	11	2
ENDRIN ALDEHYDE	10	0	0	--	--	--	0.02	0.1	--	--	NA	NA
ENDRIN KETONE	6	0	0	--	--	--	0.1	0.1	--	--	NA	NA
GAMMA-BHC (LINDANE)	10	0	0	--	--	--	0.02	0.05	--	--	NA	NA
GAMMA-CHLORDANE	6	0	0	--	--	--	0.05	0.05	0	0	0.2 (chlordanes)	NA
HEPTACHLOR	10	0	0	--	--	--	0.02	0.05	0	10	0.02	0.01

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PCBs/Pesticides (µg/L)												
HEPTACHLOR EPOXIDE	10	0	0	--	--	--	0.01	0.02	0	10	0.007	0.01
METHOXYCHLOR	10	0	0	--	--	--	0.05	0.5	0	0	180	30
TOXAPHENE	10	0	0	--	--	--	1	3	0	10	0.06	3
Metals (µg/L)												
Filtered												
ALUMINUM	43	11	26	66,000	9.8J	378,000	6.4	81.9	3	0	36,000	NA
ANTIMONY	43	6	14	4.0	0.12J	12.6J	0.068	60.0	0	7	15.0	6.0
ARSENIC	43	12	28	10.4	0.64J	59.0	1.0	100	12	31	0.045	10.0
BARIUM	43	34	79	229	9.3J	2,900	12.6	266	1	0	2,600	1,000
BERYLLIUM	43	4	9	3.4	1.1J	9.0	0.10	5.0	0	0	73.0	4.0
CADMIUM	43	10	23	2.0	0.20J	6.0	0.15	5.0	0	0	18.0	5.0
CALCIUM	43	42	98	173,000	16,000	694,000	16,600	16,600	--	--	NA	NA
CHROMIUM	43	15	35	135	0.22J	1,000	0.35	16.0	--	--	NA	50.0
COBALT	43	11	26	40.8	0.046J	220	0.046	50.0	0	0	730	NA
COPPER	43	10	23	93.8	0.31J	550	0.35	25.0	0	0	1,500	1,300
CYANIDE	24	0	0	--	--	--	1.1	10.0	0	0	730	150
IRON	43	18	42	51,500	10.1J	494,000	3.2	130	4	0	11,000	NA
LEAD	43	6	14	139	0.20J	560	0.035	50.0	--	--	NA	15.0
MAGNESIUM	43	37	86	195,000	14.0J	780,000	13.2	6,090	--	--	NA	NA
MANGANESE	43	38	88	2,880	0.23J	12,000J	0.90	10.0	19	0	880	NA
MERCURY	39	0	0	--	--	--	0.095	0.20	0	0	11.0	2.0
MOLYBDENUM	43	7	16	4.1	0.56J	9.8J	1.8	50.0	0	0	180	NA
NICKEL	43	23	53	121	1.4J	1,200	2.1	27.7	1	0	730	100
POTASSIUM	43	41	95	13,600	2,600J	53,000	2,210	3,750	--	--	NA	NA
SELENIUM	41	10	24	40.9	0.85J	150	0.85	50.0	0	0	180	50.0
SILVER	42	1	2	0.43	0.43J	0.43J	0.078	10.0	0	0	180	NA
SODIUM	43	43	100	620,000	14,900	3,200,000	0.0	0.0	--	--	NA	NA
THALLIUM	43	1	2	3.6	3.6J	3.6J	0.12	50.0	1	27	2.4	2.0
TITANIUM	4	4	100	4,730	510	9,100	0.0	0.0	--	--	NA	NA
VANADIUM	43	10	23	181	1.5J	930	0.25	50.0	3	0	260	NA
ZINC	43	17	40	231	0.70J	1,700	3.8	83.9	0	0	11,000	NA

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NOTES:

Bold denotes values elevated above the PRG

-- Not detected

BHC Benzene Hexachloride

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

DDT Dichlorodiphenyltrichloroethane

J Estimated value

MCL Maximum Contaminant Level

NA No criteria available

PCB Polychlorinated biphenyl

PRG Preliminary Remediation Goal, U.S. Environmental Protection Agency, Region 9 or CAL-modified

µg/L Micrograms per liter

TABLE 7-13: SITE 19 SUMMARY OF HUMAN HEALTH RISKS; REASONABLE MAXIMUM EXPOSURE

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EXPOSURE PATHWAY	CANCER RISK					NONCANCER HAZARD				
	Current/ Future Industrial Worker (0-2 ft)	Future Construction Worker (0-2 ft)	Future Resident (Adult + Child) (0-2 ft)	Future Construction Worker (0-8 ft)	Future Resident (Adult + Child) (0-8 ft)	Current/ Future Industrial Worker (0-2 ft)	Future Construction Worker (0-2 ft)	Future Resident (Child) (0-2 ft)	Future Construction Worker (0-8 ft)	Future Resident (Child) (0-8 ft)
Soil Exposure Pathways										
Soil Ingestion	5E-06	6E-07	2E-05	6E-07	2E-05	0.03	0.1	0.4	0.08	0.3
Dermal Contact with Soil	1E-06	7E-08	2E-06	6E-08	2E-06	0.006	0.009	0.03	0.008	0.03
Inhalation of Particulates and Volatiles Released from Soil to Outdoor Air	7E-09	3E-10	2E-08	2E-10	1E-08	--	--	--	--	--
Ingestion of Homegrown Produce	--	--	3E-05	--	3E-05	--	--	0.2	--	0.1
Soil Total	6E-06	7E-07	5E-05	6E-07	5E-05	0.03	0.1	0.6	0.09	0.5
Groundwater Exposure Pathways										
Groundwater Ingestion	--	--	2E-04	--	2E-04	--	--	16	--	16
Dermal Contact with Groundwater	--	--	4E-06	--	4E-06	--	--	0.2	--	0.2
Inhalation of Volatiles Released from Household Use of Groundwater	--	--	3E-06	--	3E-06	--	--	0.03	--	0.03
Groundwater Total	--	--	2E-04	--	2E-04	--	--	17	--	17
Multipathway Total	6E-06	7E-07	3E-04	6E-07	3E-04	0.03	0.1	17	0.09	17

Notes:

-- Not applicable; exposure pathway is not complete for this receptor.

(0-2 ft) Interval of soil below ground surface evaluated in this exposure scenario

(0-8 ft) Interval of soil below ground surface evaluated in this exposure scenario

TABLE 7-14: SITE 19 SUMMARY OF HUMAN HEALTH RISKS; CENTRAL TENDENCY EXPOSURE

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EXPOSURE PATHWAY	CANCER RISK					NONCANCER HAZARD				
	Current/ Future Industrial Worker (0-2 ft)	Future Construction Worker (0-2 ft)	Future Resident (Adult + Child) (0-2 ft)	Future Construction Worker (0-8 ft)	Future Resident (Adult + Child) (0-8 ft)	Current/ Future Industrial Worker (0-2 ft)	Future Construction Worker (0-2 ft)	Future Resident (Child) (0-2 ft)	Future Construction Worker (0-8 ft)	Future Resident (Child) (0-8 ft)
Soil Exposure Pathways										
Soil Ingestion	2E-07	2E-08	4E-06	3E-08	5E-06	0.006	0.003	0.09	0.004	0.1
Dermal Contact with Soil	8E-09	2E-09	2E-07	3E-09	2E-07	0.0002	0.0003	0.003	0.0004	0.004
Inhalation of Particulates and Volatiles Released from Soil to Outdoor Air	7E-11	3E-11	2E-10	4E-11	2E-10	--	--	--	--	--
Ingestion of Homegrown Produce	--	--	1E-06	--	2E-06	--	--	0.01	--	0.02
Soil Total	2E-07	2E-08	6E-06	3E-08	7E-06	0.006	0.004	0.1	0.005	0.1
Groundwater Exposure Pathways										
Groundwater Ingestion	--	--	5E-05	--	5E-05	--	--	15	--	15
Dermal Contact with Groundwater	--	--	4E-07	--	4E-07	--	--	0.04	--	0.04
Inhalation of Volatiles Released from Household Use of Grou	--	--	1E-08	--	1E-08	--	--	0.0002	--	0.0002
Groundwater Total	--	--	5E-05	--	5E-05	--	--	15	--	15
Multipathway Total	2E-07	2E-08	5E-05	3E-08	5E-05	0.006	0.004	15	0.005	15

Notes:

-- Not applicable; exposure pathway is not complete for this receptor.
 (0-2 ft) Interval of soil below ground surface evaluated in this exposure scenario
 (0-8 ft) Interval of soil below ground surface evaluated in this exposure scenario

**TABLE 7-15: RESULTS OF THE CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN
SCREENING FOR SOIL AT SITE 19**

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CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN	SCREENING EVALUATION	
	Rejected	Retained
Metals		
Aluminum	CSB	--
Antimony	--	--
Arsenic	CSB	--
Barium	--	X
Beryllium	CSB	--
Cadmium	CSB	--
Chromium	CSB	--
Cobalt	CSB	--
Copper	--	X
Iron	EN	--
Lead	--	X
Manganese	CSB	--
Mercury	--	--
Molybdenum	FOD	--
Nickel	CSB	--
Selenium	--	--
Silver	CSB	--
Thallium	FOD	--
Titanium	CSB	--
Vanadium	CSB	--
Zinc	--	X
Pesticides and Polychlorinated Biphenyls		
alpha-Chlordane	--	--
Aroclor-1260	--	--
4,4'-Dichlorodipenyldichloroethane	--	--
4,4'-Dichlorodipenyldichloroethylene	--	--
4,4'-Dichlorodipenyltrichloroethane	--	--
gamma-Chlordane	--	--
Heptachlor epoxide	--	--
Semivolatile Organic Compounds		
1,2,4-Trichlorobenzene	--	--
2,4-Dimethylphenol	--	--
2-Chlorophenol	FOD-NB	--
2-Methylnaphthalene	--	X
2-Methylphenol	--	--
4-Chloro-3-Methylphenol	--	X
4-Methylphenol	--	--
Acenaphthene	--	X
Acenaphthylene	--	X
Anthracene	--	X
Benzo(a)anthracene	--	X
Benzo(a)pyrene	--	X

**TABLE 7-15: RESULTS OF THE CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN
SCREENING FOR SOIL AT SITE 19**

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CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN	SCREENING EVALUATION	
	Rejected	Retained
Semivolatile Organic Compounds (Continued)		
Benzo(b)fluoranthene	--	X
Benzo(g,h,i)perylene	--	X
Benzo(k)fluoranthene	--	X
Bis(2-ethylhexyl)phthalate	--	X
Carbazole	--	--
Chrysene	--	X
Dibenzo(a,h)anthracene	--	X
Di-n-butylphthalate	--	X
Fluoranthene	--	X
Fluorene	--	X
Indeno(1,2,3-cd)pyrene	--	X
Naphthalene	--	X
n-Nitroso-diphenylamine	--	X
Pentachlorophenol	--	X
Phenanthrene	--	X
Pyrene	--	X
Volatile Organic Compounds		
1,2-Dichloroethene	--	--
1,3-Dichlorobenzene	--	X
2-Butanone	--	--
4-Methyl-2-Pentanone	--	--
Acetone	--	X
Benzene	--	--
Carbon Disulfide	--	--
Ethylbenzene	--	--
Methylene Chloride	--	X
Tetrachloroethene	--	X
Toluene	--	X
Trichloroethene	--	X
Xylene	--	X

Notes:

- These analyses were not performed.
- CSB Concentrations within statistical background
- EN Essential nutrient
- FOD Frequency of detection five percent or lower
- NB Non-bioaccumulating
- X These analyses were performed.

TABLE 7-16: SITE 19 ECOLOGICAL RISK ASSESSMENT SOIL HAZARD QUOTIENTS

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CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN	MEASUREMENT ENDPOINTS							
	Reproductive or physiological impacts to the California ground squirrel		Reproductive or physiological impacts to the Alameda song sparrow		Reproductive or physiological impacts to the American robin		Reproductive or physiological impacts to the Red-tailed hawk	
	HAZARD QUOTIENT							
	High TRV	Low TRV	High TRV	Low TRV	High TRV	Low TRV	High TRV	Low TRV
Barium	<1	<1	<1	<1	<1	<1	2.46	4.95
Copper	<1	3.54	<1	<1	<1	<1	<1	<1
Lead	<1	<1	<1	14.8	<1	49.5	<1	482
Lead alternate low TRV ^c	NA	NA	NA	<1	NA	<1	NA	1.33
Zinc	<1	2.85	<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	QE	QE	QE	QE	QE	QE	QE	QE
Bis(2-ethylhexyl)phthalate	3.52	35.1	134	1,340	10.5	105	334	3,340
Diethylphthalate	<1	<1	QE	QE	QE	QE	QE	QE
Di-n-butylphthalate	<1	1.42	41.3	413	128	1,280	170	45,400
HMW PAHs	<1	<1	QE	QE	QE	QE	QE	QE
LMW PAHs	<1	<1	QE	QE	QE	QE	QE	QE
n-Nitroso-diphenylamine	QE	QE	QE	QE	QE	QE	QE	QE
Pentachlorophenol	37.7	377	QE	QE	QE	QE	QE	QE
1,3-Dichlorobenzene	QE	QE	QE	QE	QE	QE	QE	QE
Acetone	<1	<1	QE	QE	QE	QE	QE	QE
Methylene chloride	<1	<1	QE	QE	QE	QE	QE	QE
Tetrachloroethene	<1	<1	QE	QE	QE	QE	QE	QE
Toluene	<1	<1	QE	QE	QE	QE	QE	QE
Trichloroethene	<1	<1	QE	QE	QE	QE	QE	QE
Xylene	<1	<1	QE	QE	QE	QE	QE	QE

Notes:

HMW	Exceeds hazard quotient of 1.0	PAH	Polynuclear aromatic hydrocarbon
LMW	High molecular weight	QE	No TRV developed for COPEC and endpoint-qualitative evaluation only
NA	Low molecular weight	TRV	Toxicity reference value
	Not applicable	<	Less than

TABLE 7-17: ECOLOGICAL RISK ASSESSMENT HAZARD QUOTIENTS FOR SOIL BACKGROUND

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CHEMICAL OF POTENTIAL ECOLOGICAL CONCERN	MEASUREMENT ENDPOINTS							
	Reproductive or physiological impacts to the California ground squirrel		Reproductive or physiological impacts to the Alameda song sparrow		Reproductive or physiological impacts to the American robin		Reproductive or physiological impacts to the Red-tailed hawk	
	HAZARD QUOTIENT							
	High TRV	Low TRV	High TRV	Low TRV	High TRV	Low TRV	High TRV	Low TRV
Antimony	0.042	0.218	0.000114	0.000455	0.000361	0.00144	0.00168	0.0067
Arsenic	5.06E-02	2.62E-01	1.44E-04	5.76E-04	4.65E-04	1.86E-03	1.92E-03	7.70E-03
Barium	0.0687	0.217	0.0196	0.0393	0.0622	0.125	0.294	0.592
Beryllium	0.00132	0.0132	NV	NV	NV	NV	NV	NV
Cadmium	0.0553	2.37	0.000554	0.00484	0.00179	0.0156	0.0596	0.522
Chromium	0.0171	0.0684	0.00135	0.00672	0.00462	0.023	0.00722	0.036
Copper	0.00531	1.05	0.000434	0.00577	0.00141	0.0188	0.00286	0.0379
Lead	0.0041	0.103	0.000372	2.71	0.00124	9.07	0.00299	21.9
Lead, alternate TRV	NA	NA	NA	0.0075	NA	0.025	NA	0.0603
Mercury	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	0.842	20.4	0.00429	0.0174	0.0137	0.0554	0.0684	0.277
Zinc	0.00523	1.37	0.000404	0.00404	0.00127	0.0127	0.00723	0.0723

Notes:

NA Not applicable
 ND Not detected in background samples
 NV Reference value not available, HQ could not be calculated
 TRV Toxicity reference value

8.0 BACKGROUND AND RI RESULTS FOR CERCLA SITE 22 BUILDING 547 (FORMER SERVICE STATION)

Section 8.0 includes a comprehensive site summary and analysis of contamination located at CERCLA Site 22. The physical features and history of the site are presented in Section 8.1. The physical features and history of the site are presented in Section 6.1. The investigation history is presented in Section 8.2, and the initial data evaluation, which includes the site-specific conceptual site model, data quality assessment, and background evaluation, are presented in Section 8.3. The nature and extent evaluation is presented in Section 8.4, and the fate and transport analysis is included in Section 8.5. The HHRA and ERA are summarized in Sections 8.6 and 8.7, respectively. Conclusions and recommendations for Site 22 are identified in Section 8.8.

8.1 PHYSICAL FEATURES AND SITE HISTORY

This section summarizes the physical features and history of Site 22. The physical features of Site 22 are summarized in Section 8.1.1. The history and activities conducted at Site 22, including hazardous wastes generated and past disposal and storage practices associated with the wastes, are described in Section 8.1.2. The Site 22 regulatory history is summarized in Section 8.1.3.

8.1.1 Site 22 Physical Features

Site 22 occupies approximately 2.1 acres in the northeast corner of OU-2A (see Figure 1-2). Site 22 generally coincides with the location of EBS Subparcel 145 and CAA 4C. The site operated as a gasoline service station between 1971 and 1980. Activities at the site included gasoline storage and pumping, car washing, and miscellaneous automobile repairs. Several former USTs located at Site 22 were used to store gasoline and waste oils. An OWS (OWS 547) is adjacent to the location of the former car wash.

Most of Site 22 is paved with concrete and retains some of the foundations from the former service station and fuel pump island. Grass and other landscaping exist in the western portion of the site, and along the northern border. Site 22 is bordered to the west by the City of Alameda, to the south and east by Site 13, and to the north by Site 4.

8.1.2 Site 22 History

Before the Navy took possession of NAS Alameda in 1936, the area known as Site 22 existed at the western edge of the peninsula of Alameda. Aerial photographs from 1930 show what appears to be a large barn and farmland in the area.

After the Navy took possession of the property, it was used for barracks until the mid 1970s. Aerial photographs from 1959 and 1963 show 14 Quonset huts around a large open area in the middle of Site 22. Roads border Site 22 on the south and west.

In 1970, a gasoline service station was constructed on the site and operated by the Navy. Several buildings were constructed, including a cashier/bathroom building (Building 547-A), a fuel pump island (Structure 547), and a car wash (Building 547-1). OWS 547 is located adjacent to the car wash. Three USTs (547-1 through -3, also known as UST(R)-17) and associated fuel lines to the fuel pump island were also installed. The locations of these features are shown on Figure 8-1.

In 1980, one of the USTs (tank number unknown) was punctured when a measuring dipstick was dropped into the bottom of the tank. The UST was reportedly repaired between 1980 and 1987. Additional testing during 1988 revealed that the UST was leaking, and it was removed from service. In 1982, leaking fuel lines were replaced.

In 1994, the service station was demolished. USTs 547-1 through 547-3 were removed by the Navy PWC in 1994, and associated fuel lines were removed in 1995 (PWC 1997). The OWS remains in place, although it has received water from the car wash since it was demolished.

8.1.3 Site 22 Regulatory History

Several facilities and areas within Site 22 are regulated by different programs. These programs include the CERCLA program, the TPH program, and the RCRA program. The sections below briefly describe the history of each program at Site 22.

8.1.3.1 CERCLA Program

Site investigations were conducted at Site 22 to assess whether waste oil tanks reportedly on site had released CERCLA contamination into soil and groundwater. Site 22 was included in the RI/FS work plan prepared by Canonie (1989, 1990).

8.1.3.2 RCRA Program

One item within Site 22, UST(R)-17, was identified in the RFA (DTSC 1992a). UST(R)-17 consists of three USTs that contained gasoline. These USTs have been removed and are currently being addressed under the TPH Program. This site is recommended for continued closure under the TPH Program; Navy recommendations are included in SWMU Appendix (Appendix G).

8.1.3.3 TPH Program

After Alameda Point was identified for closure in September 1993, the TPH program was implemented to decommission all USTs and other fuel-related items. As part of the program, TPH contamination was evaluated at 16 sites, known as CAAs. Several investigations were conducted under the TPH program and are summarized in Section 8.2.4. Site 22 was designated as CAA 4C under the TPH program.

A corrective action plan (CAP) to address petroleum contamination at Site 22 was submitted to RWQCB on July 30, 2003 (Tetra Tech 2003c). RWQCB issued a letter concurring with the cleanup method proposed in the CAP on September 15, 2003.

8.2 SITE 22 ENVIRONMENTAL INVESTIGATIONS

This section describes the environmental investigations conducted at Site 22, which include investigations conducted before the IRP, under CERCLA, under the EBS and TPH programs, and during removal actions.

Tables 8-1 and 8-2 summarize the soil and groundwater samples collected by the environmental investigations conducted at Site 22 and the types of analyses conducted. Sampling locations are shown on Figure 8-2 and are categorized by investigation. Results for each investigation are presented in Tables 8-3 through 8-12. The tables are organized by analyte group; the number and percent of detections; the minimum, average, and maximum detected concentration; the minimum and maximum detection limit; the number of detections over the 2002 residential or tap water PRG (EPA 2002a); the number of analytical detection limits exceeding the PRG, and the PRG.

8.2.1 Investigations Conducted Before the IRP

Before the inception of the IRP, UST testing was performed at Site 22 in 1987 and 1988. The 1987 testing performed by ERM-West revealed that the fuel lines to the tanks were leaking; they were subsequently replaced. In 1988, the UST that had been repaired failed a precision tightness test and was taken out of service.

8.2.2 CERCLA Investigations

Investigations conducted at Site 22 under CERCLA include the Phase 1 and 2A investigation performed in 1991, the follow-on investigations conducted in 1994 and 1998, the storm sewer investigation in 2000, the supplemental RI data gap sampling performed in 2001, the basewide groundwater monitoring conducted in 2002 and 2003, and the PAH study in 2003.

Boring logs for all investigations are presented in Appendix B.

8.2.2.1 Phase 1 and 2A Investigation, 1991

The Navy contracted with Canonie to conduct the Phase 1 and 2A investigation to determine whether activities related to the service station and associated USTs and a suspected waste oil UST impacted soils and groundwater at Site 22 (Canonie 1989). The investigation included performing a soil gas survey, drilling boreholes, constructing monitoring wells, and sampling groundwater. Sampling locations for this investigation are shown on Figure 8-2. Tables 8-3 and 8-4 list the soil and groundwater samples and the analyses performed.

Soil

During the 1991 investigation, 10 soil borings (B547-1 through B547-10) were drilled and five monitoring wells (MW547-1 through MW547-5) were installed at five of the boring locations (B547-1 through B547-5). To evaluate if chemicals were present in the areas investigated, 127 soil samples were collected at 1.0- to 1.5-foot intervals and analyzed for VOCs, SVOCs, pesticides and PCBs, metals, TRPH, TOC, pH, and general chemistry characteristics. The table below summarizes the chemicals detected at concentrations exceeding the residential PRG (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 22 1991 Phase 1 and 2A Investigation Soil Summary		
Analytical Group	Detected Chemicals Exceeding 2002 Residential PRG	Location of Highest Concentration
VOCs	Ethylbenzene	MW547-3
SVOCs	Benzo(a)pyrene*	MW547-5
Pesticides and PCBs	None	Not Applicable
Metals	Arsenic and iron	MW547-3
	Lead	MW547-5

Note:

PAH data collected for soil during this investigation were not used in this RI because of high detection limits; data from additional PAH sampling conducted in 2003 were used.

No PCBs or pesticides were detected in soil above their respective residential PRGs.

Ethylbenzene was detected at a concentration exceeding the PRG in one soil sample collected at a depth of 3.5 to 4 feet bgs during installation of monitoring well MW547-3. No other VOCs were detected at concentrations over their respective PRGs in soil samples collected during this investigation.

No SVOCs were detected in soil at concentrations exceeding their respective residential PRGs. Benzo(a)pyrene was detected at a concentrations exceeding the 2002 residential PRG in the SVOC analytical run in one soil sample collected at a depth of 5 to 5.5 feet bgs during installation of monitoring well MW547-5.

Arsenic (30 samples), iron (MW547-3 [5.5 to 6.0]), and lead (MW547-5 [0.5 to 1.0]) concentrations exceeded the 2002 residential PRG.

Groundwater

Five of the 10 borings mentioned previously were completed as monitoring wells, one in each corner of Site 12 and one southwest of the pump island. Five groundwater samples were collected, one from each monitoring well, and were analyzed for VOCs, SVOCs, pesticides metals, TRPH, TOC, and cations and anions. The table below summarizes the chemicals

detected at concentrations exceeding the tap water PRG (EPA 2002a) and the sampling location with the highest detected concentration for each chemical.

Site 22 1991 Phase 1 and 2A Investigation Groundwater Summary		
Analytical Group	Detected Chemicals Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOCs	Benzene	MW547-3
	Ethylbenzene	MW547-5
SVOCs	Naphthalene	MW547-3
Pesticides	None	Not Applicable
Metals	Aluminum, iron, manganese, nickel, and vanadium	MW547-2
	Arsenic	MW547-1

Notes:

PAHs analyzed with SVOC analytical group

Benzene and ethylbenzene were detected at concentrations exceeding the tap water PRG (EPA 2002a) in three of five groundwater samples collected from monitoring wells MW547-3 through MW547-5. No other VOCs were detected at concentrations exceeding their respective tap water PRGs in groundwater samples collected during this investigation.

No SVOCs were detected in groundwater at concentrations exceeding their respective tap water PRGs (EPA 2002a). Naphthalene was detected at concentrations exceeding the 2002 residential PRG in the SVOC analytical run in two groundwater samples collected from monitoring wells MW547-3 and MW547-4.

No pesticides were detected in groundwater at concentrations exceeding their tap water PRGs (EPA 2002a).

Various metals that exceeded the 95 percent/95 percent statistical tolerance level for background were detected in groundwater (PRC and JMM 1992). Aluminum, arsenic, iron, manganese, nickel, and vanadium exceeded 2002 tap water PRGs (EPA 2002a).

Soil Gas

A soil gas survey targeting BTEX and TPH was conducted using a grid with approximately 50-foot spacing (Canonie 1989). Sixty-two samples were collected to evaluate the extent of hydrocarbons in soil vapors. Benzene and TPH were detected in many locations, but the highest concentrations were found west of the fuel pump island and along the western edge of Site 22. Soil gas sampling locations were not surveyed and are not shown on Figure 8-2.

Analytical detection limits of numerous VOC, SVOC, and metals in soil and groundwater exceeded 2002 residential PRGs (EPA 2002a). Furthermore, QA/QC information was not

available for data validation when the investigation report was prepared. As a result, groundwater and soil data were used for qualitative purposes only for the investigation report, but the Navy and agencies deemed the data acceptable for inclusion in the risk assessments.

Recommendations for future work included collection of additional soil samples to evaluate the extent of light and heavy hydrocarbons at Site 22. The collection of additional groundwater samples was recommended to evaluate tidal influence on the shallow and deep water-bearing zone, to better characterize the quality of groundwater, and to evaluate whether groundwater beneath Site 22 was considered a potential drinking water source. It was noted that no groundwater monitoring well was located downgradient of the southern edge of Site 22 to characterize groundwater in that area.

The investigation report concluded that based on the samples collected sufficient metals data were collected in soil for the RI/FS and that VOCs, SVOCs, and petroleum detected at Site 22 would be addressed during the risk assessments (PRC and JMM 1992).

8.2.2.2 Follow-On Investigation, 1994

Based on recommendations of the 1991 investigation (PRC and JMM 1992) and discussions with the regulatory agencies, a follow-on investigation was conducted to provide additional lithologic, chemical, and hydrogeologic information to assess the nature and extent of soil and groundwater contamination at Site 22 for the RI/FS (PRCEMI and MW 1994). Analytical data from the initial Phase 2A investigation indicated the presence of elevated concentrations of VOCs, SVOCs, pesticides, metals, TRPH, and EDB in soil and of VOCs, SVOCs, metals, and TRPH in groundwater at Site 22. Activities conducted under the follow-on investigation included performing a geophysical survey, drilling boreholes, constructing monitoring wells, performing a CPT analysis, sampling groundwater using a Hydropunch, sampling at nonpoint sources, and performing quarterly groundwater monitoring (PRC and MW 1995). Sampling locations for this investigation are shown on Figure 8-2.

A geophysical survey was conducted across Site 22 to determine the presence and location of two waste oil tanks suspected to be near the western portion of the site, but the tanks were not located (PRC and MW 1995).

Four CPT locations were driven to evaluate lithology and hydrogeologic characteristics below a depth of 15 feet. Hydropunch groundwater sampling was conducted adjacent to these locations to assess the impact of chemicals to deeper groundwater. Results of both activities identified the need for deeper monitoring wells at Site 22 (PRC and MW 1995).

Soil

Twenty-nine soil samples were collected from 10 boreholes during this investigation. The boreholes were logged continuously to provide for additional lithologic information about Site 22. Three of these soil borings were located near the USTs in the northwest corner of Site 22 to

characterize light and heavy fractions of petroleum hydrocarbons. The samples were analyzed for VOCs, SVOCs, and metals (see Table 8-5). The table below summarizes the chemicals detected at concentrations exceeding the residential PRG and the location with the highest concentration for each chemical.

Site 22 1994 Follow-On Investigation Soil Summary		
Analytical Group	Detected Chemicals Exceeding 2002 Residential PRG	Location of Highest Concentration
VOCs	Benzene	B07C-12
	Ethylbenzene, toluene, and total Xylenes	B07C-14
SVOCs	Benzo(a)pyrene	M07C-08
Metals	Arsenic	B07C-15

Note:

PAH data collected for soil during this investigation were not used in this RI because of high detection limits; data from additional PAH sampling conducted in 2003 were used.

TPH-E and TPH-P, petroleum-related VOCs, and PAHs were detected in soil samples collected at Site 22. Impacted areas were mainly northwest of the fuel island, in the vicinity of the fuel lines.

BTEX was detected in soil at concentrations exceeding their respective residential PRGs (EPA 2002a). SVOCs were detected in soil samples collected during this investigation. Benzo(a)pyrene was detected at a concentrations exceeding the 2002 residential PRG (EPA 2002a) in the SVOC analytical run in boring M07C-08 (0.5 to 1 feet bgs).

Arsenic was detected in 10 of 16 soil samples at concentrations exceeding the residential PRG (EPA 2002a). No other VOCs, SVOCs, or metals were detected at concentrations exceeding their respective residential PRGs.

Groundwater

Four of the boreholes were converted to shallow monitoring wells. One borehole was converted to a deep monitoring well (D7C-01) (see Figure 8-2). The wells were installed to (1) characterize the lateral extent of VOCs detected in groundwater downgradient of Site 22; (2) further characterize VOCs, metals, and petroleum hydrocarbons concentrations in the shallow groundwater aquifer; and (3) further characterize groundwater gradients and flow directions at Site 22. The wells installed during this phase and existing wells were sampled on a quarterly basis for 1 year. Water levels were also measured quarterly to characterize seasonal changes in groundwater flow directions and gradients. Five of the wells were not sampled during the fourth quarter (PRC and MW 1996). Table 8-6 presents the groundwater analytical results for the 1994 investigation. The table below summarizes the chemicals detected at concentrations exceeding the tap water PRG and the location with the highest concentration for each chemical.

Site 22 1994 Follow-On Investigation Groundwater Summary		
Analytical Group	Detected Chemicals Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOCs	1,2-DCA	DHP-S07C-03
	Benzene and ethylbenzene	MW547-3
SVOCs	Naphthalene	MW547-3
	Pentachlorophenol	DHP-S07C-02
Metals	Arsenic	MW547-3
	Manganese and thallium	DHP-S07C-01

Note:

PAHs analyzed with SVOC analytical group

VOCs, SVOCs, metals, and TPH, were detected in groundwater samples collected during the 1994 follow-on investigation at concentrations exceeding 2002 tap water PRGs (EPA 2002a). Various metals that exceeded the 95 percent/95 percent statistical tolerance level for background were detected in groundwater (PRC and JMM 1992). Arsenic, manganese, and thallium exceeded the 2002 tap water PRGs (EPA 2002a).

Analytical detection limits of numerous VOC, SVOC, and metals in soil and groundwater exceeded the 2002 tap water PRGs (EPA 2002a).

Nonpoint Source Samples

One nonpoint source sample was collected from the storm drain catch basin 6J-1A, southwest of Site 22 on Eleventh Avenue, downstream of the inlets located on the western portion of the site. Figure 8-2 shows the nonpoint sampling location.

Based on the data collected, it was determined that chemicals detected during this investigation were similar in nature to those found during previous investigations. The extent of chemicals appeared to be adequately characterized; however, the need for additional investigation was recommended to evaluate if a human health or environmental risk was defined during the risk assessment (PRC and MW 1995).

8.2.2.3 Follow-On Investigation, 1998

This investigation consisted of basewide quarterly groundwater monitoring to assess and monitor the extent of plumes at various sites at Alameda Point. Four wells at Site 22 were sampled to monitor the migration and degradation of a petroleum and VOC plume at the site. Monitoring well MW547-4 was selected because it exhibited the highest concentrations of petroleum hydrocarbons at Site 22. Three other wells near the outer edge and downgradient of the plume were also selected for groundwater monitoring. One well (M07C-07) was not sampled during quarters three and four (Tetra Tech and U&A 1998). Sampling locations are presented on Figure 8-2. Table 8-7 is a statistical summary of groundwater samples collected during the 1998

investigation. The table below summarizes the chemicals detected at concentrations exceeding the PRG and the sampling location with the highest concentration for each chemical.

Site 22 1998 Follow-On Investigation Groundwater Summary		
Analytical Group	Detected Chemicals Exceeding 2002 Residential PRG	Location of Highest Concentration
VOCs	Benzene and ethylbenzene	MW547-4
	TCE	M07C-08
Metals	Arsenic and manganese	MW547-4

Benzene and ethylbenzene were detected in samples collected from monitoring well MW547-4 at concentrations exceeding their respective tap water PRGs (EPA 2002a). TCE was detected in a sample from monitoring well M07C-08 on the eastern border of Site 22 at a concentration exceeding the tap water PRG (EPA 2002a).

Various unfiltered and filtered metals were detected at concentrations above reporting limits in groundwater samples collected during this investigation, but only arsenic and manganese were detected at concentrations exceeding the tap water PRGs (EPA 2002a).

Petroleum was detected frequently in several sampling locations.

Data from this investigation were used in the basewide analysis of ambient water quality (Tetra Tech 1998) and in the evaluation of the beneficial uses of groundwater (Tetra Tech 2000a). Samples from the first quarter of groundwater monitoring were also analyzed for TOC to help evaluate the degradation potential for petroleum hydrocarbons.

8.2.2.4 Storm Sewer Investigation, 2000

This basewide investigation evaluated the physical conditions of storm sewers and the places where storm sewers are submerged below groundwater; identified locations where contaminated groundwater intercept submerged, damaged sections of storm sewers; and identified significant data gaps for further evaluation (Tetra Tech 2000b). During this investigation, the conditions of storm sewer conditions were assessed and manholes 6J-1A to 6J-1B (the portion of the storm drain located within Site 22) were logged by video. The storm drain from manholes 6J-1A to 6J-1B is a 332-foot long, 12-inch reinforced concrete pipe. The depth of the storm drain is unknown. Video logging detected a damaged area in the section of the storm drain between manholes 6J-1A and 6J-1B. It is unknown whether groundwater infiltration is occurring in the damaged area. A TTPH plume with concentrations of 1.4 mg/L and an ethylbenzene plume with concentrations of 0.005 mg/L that intersect the southern portion of the storm drain from manholes 6J-1A to 6J-1B were delineated (Tetra Tech 2000b); plume contours were developed using averages of the data collected from each monitoring well between June 1990 and April 2000. The section of the storm drain from manholes 6J-1A to 6J-1B was ranked as "low priority" because the plumes do not intersect the damaged section of the storm drain.

8.2.2.5 Supplemental Data Gaps Investigation, 2001

Based on identified data gaps, a supplemental data gap sampling effort was conducted at OU-2A to address two primary data gaps categories: (1) the status of groundwater contaminant plumes and (2) preferential flow paths associated with the storm sewer system (Tetra Tech 2002a). The investigation at Site 22 included sampling of groundwater monitoring wells, but did not include sampling of bedding material at the storm sewers. Additional sampling for secondary data gaps, including collecting soil gas samples, was conducted within Site 22.

Groundwater

Seven groundwater monitoring wells at and three wells adjacent to Site 22 were sampled to establish current site conditions, identify point-of-compliance wells for long-term monitoring, and approximate exposure areas for the risk assessments (Tetra Tech 2002a). See Tabel 8-8. Water level elevations were also collected to provide local conditions of groundwater flow. The table below summarizes the chemicals detected at concentrations exceeding the tap water PRG and the sampling location with the highest concentration for each chemical.

Site 22 2001 Supplemental Data Gaps Sampling Investigation		
Analytical Group	Detected Chemicals Exceeding the 2002 Tap Water PRG	Location of Highest Concentration
VOCs	1,2-DCA and carbon disulfide	CAA4C-DGS-DP05
	Acetone, ethylbenzene, and total xylenes	CAA4C-DGS-PZ01
	Benzene and toluene	CAA4C-DGS-DP01
PAHs	Naphthalene	MW547-3

VOCs detected in groundwater at concentrations exceeding their respective tap water PRGs (EPA 2002a) included 1,2-DCA, acetone, benzene, carbon disulfide, ethylbenzene, toluene, and total xylenes. TPH constituents, most commonly TPH-g and TPH-jet fuel, were detected in all groundwater samples collected.

Naphthalene was detected at concentrations exceeding the tap water PRG (EPA 2002a) in samples from one well (MW547-3) during both the SVOC and PAH analytical runs. No other PAHs were detected at concentrations exceeding the tap water PRG in groundwater samples.

Soil Gas

Soil gas sampling was conducted to refine risk assessment calculations associated with the exposure route for volatilization of chemicals into buildings (Tetra Tech 2002a).

Two borings for soil gas sampling were advanced at locations selected with assistance from the BCT for use in future risk assessment (see Figure 8-2). At each soil gas sampling location, two continuous core soil borings were completed to determine specific groundwater depths and

evaluate physical soil parameters required for the risk assessment model. Samples were collected at depths of 1.5 and 4.0 feet bgs. BTEX was detected in all four of the soil gas samples.

Results of this investigation provided further information about the extent of contaminants at Site 22 (Tetra Tech 2002a). The benzene plume in groundwater was found to extend south of the former fuel pump island. Sampling was conducted in accordance with the FSP and accompanying QAPP and project-specific DQOs (Tetra Tech 2001a). Analytical detection limits were established based on MCLs and not 2002 residential PRGs (EPA 2002a).

8.2.2.6 Basewide Groundwater Monitoring, 2002 and 2003

The specific objectives of the 2002 and 2003 basewide groundwater monitoring were (1) to evaluate contaminant plumes in groundwater and (2) to determine the main chemicals of concern (Shaw 2003a). The monitoring scheme for OU-2A included 23 of the 46 wells located within the five sites of OU-2A (Sites 9, 13, 19, 22, and 23). One well (MW547-3) located within Site 22 was sampled quarterly. Two other wells (D07C-01 and M07C-08) were sampled semi-annually (two times per year). The first round of sampling was conducted in June 2002 (IT 2002). Samples were analyzed for VOCs, dissolved metals, TPH-E and TPH-P (see Table 8-9). Sampling locations are presented on Figure 8-2. The table below summarizes the chemicals detected at concentrations exceeding the tap water PRGs (EPA 2002a) and the sampling location with the highest concentration for each chemical.

Site 19 2002 and 2003 Basewide Groundwater Monitoring Investigation		
Analytical Group	Detected Chemicals Exceeding 2002 Tap Water PRG	Location of Highest Concentration
VOCs	Benzene, chloroform, ethylbenzene, n-propylbenzene, naphthalene, PCE, and TCE	MW547-3
Metals	Arsenic, iron, and manganese	MW547-3

VOCs were detected at concentrations exceeding tap water PRGs (EPA 2002a) in groundwater samples from well MW547-3 only. These VOCs included benzene, chloroform, ethylbenzene, n-propylbenzene, naphthalene, PCE, and TCE. TPH-g, TPH-d, and TPH-jet fuel were also detected. Arsenic, iron, and manganese were detected at concentrations exceeding their respective PRGs (EPA 2002a) were detected in samples from monitoring well MW547-3.

8.2.2.7 Basewide PAH Study, 2003

The objective of the PAH study was to collect sufficient PAH data to calculate EPCs for risk assessments at CERCLA sites (Bechtel 2003). Historical PAH data collected at each CERCLA site were used to estimate the mean and standard deviation of BaP concentrations to determine the appropriate number of PAH samples to collect at each site. At Site 22, 22 soil borings were advanced using direct-push sampling methods. Samples were collected from each of the borings

at the following four depth intervals: 0 to 0.5, 0.5 to 2, 2 to 4, and 4 to 8 feet bgs. In general, PAHs were detected at concentrations less than PRGs and below the action level (see Table 8-10). Sampling locations for the PAH study are presented on Figure 8-3. The table below summarizes PAHs detected at concentrations exceeding the residential PRG (EPA 2002a) and the sampling location with the highest concentration for each chemical.

Site 22 2003 PAH Study		
Analytical Group	Detected Chemicals Exceeding 2002 Residential PRG	Location of Highest Concentration
PAH	BaP, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene	C3S022B009
	Chrysene	C3S022B018
	Naphthalene	C3S022B007

8.2.3 EBS

The EBS was performed to identify the environmental condition of all base property and facilities to facilitate transfer to the community as expeditiously as possible. Two phases of the EBS were conducted at the installation. Results for the EBS investigations are presented in Table 8-13.

Phase 1. The first phase of investigation comprised an examination of aerial photographs and historical records as well as the performance of site inspections and interviews with current and former employees involved in operations. The Phase 1 EBS investigation concluded that many parcels had insufficient information to classify them as transferable; therefore, recommendations for additional investigation were prepared and presented in the zone analysis plans and parcel evaluation plans (ERM-West 1995a, 1995b).

Phase 2A. As recommended by the IAS (E&E 1983), the Phase 2 investigation did not focus on areas already under evaluation. Other Navy land uses or areas that may impact transfer were the subject of the investigations. Site 22 lies within EBS Zone 22 and consists solely of Parcel 145. Soil sampling was conducted at this parcel in January 1995 during the Phase 2A investigation. No zone- or parcel-specific sampling was conducted in Parcel 145 (IT 2001).

During Phase 2A, one sediment sample was collected in a storm sewer at the southwestern corner of Site 22. The sample was analyzed for CLP SVOCs, VOCs, X-ray fluorescence metals, TPH-E and TPH-P, and reactivity (IT 2001). A low concentration of BaP was detected in the sample. The location of this EBS sample is depicted on Figure 8-2.

8.2.4 TPH Program

The borders of Site 22 are roughly the same as CAA 4C. Three investigations conducted under the TPH program at Alameda Point included Site 22. These studies were a metal detector survey

(Precision Locating 1998), a free-phase floating product investigation (Tetra Tech 2000c), a data gaps investigation for CAAs (Tetra Tech 2001e), and a CAP for CAA 4C (Tetra Tech 2003c).

Metal Detector Survey. In August 1998, a metal detector survey was conducted to locate the reported 5,000- and 10,000-gallon metal USTs (547-4 and 547-5). CAA 4C was searched on a 5-foot grid using a Fisher TW-6 split box locator mounted on a staff. No indications of a metallic anomaly indicative of an UST were found within CAA 4C (Precision Locating 1998).

Floating Product Investigation. In October 1999, the possible presence of floating product was investigated at selected UST sites at Alameda Point. The investigation included assessing organic vapors in monitoring wells using a flame ionization detector (FID) and a photoionization detector (PID), measuring the groundwater elevation using a water level meter, and measuring possible floating product using an oil/water interface probe (Tetra Tech 2000c).

Seven monitoring wells (MW547-1 through MW547-5, M07C-08, and M07C-09) were investigated for floating product (as shown on Figure 8-2). VOCs were detected with the PID/FID in ambient air and at the open wellheads of monitoring wells MW547-3 and M07C-08. Floating product was not detected with the oil/water interface probe in any of the monitoring wells (Tetra Tech 2000c).

Data Gaps Investigation at CAAs. In April 2000, a data gaps investigation was conducted at CAA 4C to determine whether MTBE and chlorinated hydrocarbons were present in groundwater. MTBE (not analyzed during previous investigations) and chlorinated hydrocarbons were detected in groundwater north of CAA 4C in Site 4. Chlorinated hydrocarbons were possibly associated with operations conducted in Building 360 (a former plating shop), located northwest of CAA 4C. However, if chlorinated hydrocarbons had been present in groundwater at concentrations that presented a risk to human health or the environment, then contaminated groundwater would have been addressed under the CERCLA program (Tetra Tech 2001e).

Four Hydropunch samples were collected at depths of 10 and 50 feet bgs at two sampling locations (CA04-05 and CA04-06), north and northwest of the Site 22 boundary. Groundwater samples were collected from monitoring wells MW547-1, MW547-4, M07C-08, and M07C-09. These sampling locations are shown in Figure 8-2. Groundwater samples were analyzed for VOCs. MTBE was not detected in any of the groundwater samples; however, toluene was detected in four of the samples. Chlorinated hydrocarbons were not detected above the laboratory reporting limits (Tetra Tech 2001e).

CAP for CAA-4C. The widespread presence of petroleum in soil and groundwater at Site 22 is directly related to operation of the gas station and fuel releases that occurred during that time; therefore, this site is addressed under the TPH program. A TPH evaluation was conducted, and results of the evaluation are presented in the draft CAP for CAA 4C (Tetra Tech 2003c); the CAP addresses remedial alternatives for the cleanup of all TPH-related compounds at Site 22. The RWQCB has approved this CAP and the remedial design for CAA-4C. Remedial action consisting of DVE began in July 2004.

8.2.5 Removal Actions

In November 1994, PWC removed USTs 547-1 through 547-3 (see Figure 8-1). At the time of removal, the condition of the USTs was not noted; however, the excavation sidewalls had visible signs of contamination at approximately 5 feet bgs. PWC collected three soil samples (547-W1 through 547-W3) and two groundwater samples (547-L1 and 547-L8) from the UST excavation at the soil/groundwater interface (approximately 9.5 feet bgs). Soil and groundwater samples were analyzed for BTEX, lead, TPH-E and TPH-P, and TRPH. Appendix E provides the complete analytical results for this removal action. Benzene, ethylbenzene, and xylene were detected in all three soil samples, and toluene was detected in two soil samples. Lead was not detected in any of the three soil samples analyzed. TPH-g and TPH-d were detected in all three soil samples, TPH-jet fuel was detected in two soil samples, and TPH-mo was detected in one soil sample. The groundwater sample exhibited concentrations of BTEX, lead, and TTPH.

In January 1995, PWC removed about 1,500 feet of fuel lines from the pump island area and collected 14 soil samples (547-1 through 547-14) from the base of the fuel line excavations, as shown on Figure 8-2. Soil samples were analyzed for BTEX, lead, and TPH-E and TPH-P. The maximum BTEX concentrations were detected at sampling locations 547-3 and 547-5. Lead was detected in all 14 samples, with the maximum concentrations detected at sampling locations 547-6 and 547-11 (located in the northeast and southern portion of the fuel pump island area, respectively). TPH-d and TPH-jet fuel were detected in all 14 soil samples; TPH-g was detected in 7 samples and TPH-mo was detected in 13 samples (see Appendix E). The maximum TPH fraction concentrations were detected at sampling locations 547-3 and 547-5 (located in the northern portion of the fuel pump island area). Sampling locations for this investigation are presented on Figure 8-2.

In July 2004, remedial action using DVE began to remove floating petroleum product and vent the vadose zone above groundwater at Site 22.

8.2.6 Treatability Studies

No treatability studies were conducted within Site 22.

8.3 INITIAL DATA EVALUATION

Based on the investigations described in Section 8.2, the Navy completed an initial data evaluation for Site 22. This evaluation included (1) a site-specific CSM, (2) a data quality assessment, and (3) a background comparison. The complete background comparison is provided in Appendix A.

8.3.1 Site 22 Conceptual Site Model

The initial CSM was refined in an iterative process that involved conducting environmental investigations, identifying areas of known or potential releases of chemicals to the environment,

and filling data gaps. This iterative process resulted in a CSM specific to Site 22 and identification of remaining data gaps. This site-specific CSM was used to support the nature and extent evaluations and risk assessments by identifying potential sources of contamination, media affected, exposure pathways, and future receptors. The CSM for Site 22 is described below and presented on Figure 8-5.

Through environmental investigations and literature searches for Site 22, physical features and activities at Site 22 that might have generated hazardous waste or released chemicals to the environment were identified. The following physical features and activities were identified as potential sources of contamination:

- Former gasoline service station and associated USTs 547-1 through 547-3 (UST(R)-17) and fuel lines – USTs 547-1 through 547-3 stored gasoline; at least one UST and fuel lines were confirmed to have leaked fuel; potential source of petroleum products.
- Building 547-1 (car wash) and associated OWS 547 – potential source of petroleum products.
- Placement of dredged fill material used to build the island – potential source of PAHs.

Sufficient sampling has not been conducted near OWS 547, which is associated with the car wash, to determine whether soil or groundwater contamination occurred during operation of the car wash. The SWMU evaluation report (see Appendix G) indicates a data gap for OWS 547.

Of these potential sources, (1) the former gas station and associated USTs 547-1 through -3 and fuel lines, (2) OWS 547 associated with the car wash, and (3) fill material containing PAHs were identified as likely sources of contaminants in soil and groundwater at Site 22. The exposure pathways and primary and secondary release mechanisms may include the following:

- Direct release of petroleum products associated with the former gas station and associated USTs 547-1 through 547-3 and fuel lines to soil and groundwater.
- Direct release of petroleum products associated with OWS 547 to soil.
- Placement of fill material that contained PAHs.
- Secondary release from soil to air through volatilization or resuspension of particulates.
- Secondary release from soil into the food chain from plant uptake.
- Secondary release from soil to groundwater through infiltration uptake.
- Secondary release from groundwater to air through volatilization.
- Secondary release from groundwater into domestic use through a well.

As shown in the CSM for Site 22 (see Figure 8-5), residential, commercial/industrial, and construction worker receptors were identified as potential human receptors, and exposure scenarios, including ingestion of homegrown produce and ingestion, inhalation, and dermal contact with soil and groundwater, are evaluated in the HHRA (see Appendix H). Exposure of potential ecological receptors to contaminants through direct contact with soil and the food chain were also evaluated in the ERA (see Appendix I).

Exposure of potential ecological receptors to groundwater from migration to surface water was considered an incomplete pathway. Site 22 is not tidally influenced, groundwater contamination has not migrated to San Francisco Bay, and the storm sewer system at Site 22 is not considered a preferential pathway for contaminant migration to San Francisco Bay. In addition, samples collected from the storm drain bedding downstream at Site 22 did not exhibit VOCs at concentrations exceeding the detection limits, indicating that the bedding is not a migration pathway.

A storm sewer line runs along the western border of Site 22 from manholes 6J-1A to 6J-1B. The storm drain from manholes 6J-1A to 6J-1B is a 332-foot long, 12-inch reinforced concrete pipe. The depth of the storm drain is unknown. Video logging during 2000 detected a damaged area in the section of the storm drain between manholes 6J-1A and 6J-1B (Tetra Tech 2000b). It is unknown whether groundwater infiltration is occurring in the damaged area. A TTPH and ethylbenzene plume intersecting the southern portion of the storm drain from manholes 6J-1A to 6J-1B was delineated in the storm sewer addendum report (Tetra Tech 2000b); plume contours were developed using averages of the data collected from each monitoring well between June 1990 and April 2000. The section of the storm drain from manholes 6J-1A to 6J-1B was ranked as "low priority" because the plumes do not intersect the damaged section of the storm drain.

8.3.2 Site 22 Data Quality Assessment

As discussed in Section 8.2, several environmental investigations were conducted at Site 22 as a part of the CERCLA and EBS programs to identify and assess the extent of contamination in soil and groundwater and to determine risk. Data were collected over a period of approximately 13 years from 1990 through 2003 using a biased and phased sampling approach. Sampling focused on the following:

- Gasoline station and associated USTs, and soil and groundwater suspected to be impacted by a waste oil UST
- VOCs, SVOCs, pesticides, metals, and TPH in soil, and VOCs, SVOCs, metals, and TPH in groundwater
- Monitoring the migration and degradation of a petroleum and VOC plume
- Industrial, sanitary, and storm sewers
- Fill material and native sediments to assess the presence of PAHs

These data, through an iterative process, were used to construct and refine the site-specific CSM conceptual site model presented in Section 8.3.1 and to identify and fill data gaps until the quantity and quality of the data at Site 22 were judged to be sufficient to complete the RI report, as determined by applying the DQOs presented in Section 3.4.

Detection limits for some of the data used to evaluate Site 22 are elevated over residential PRGs (EPA 2002a); these elevated detection limits are the consequence of one or more of the following circumstances: (1) the evolution of lower detection limits as technology improves, (2) the revision of PRGs over time (which are not always technologically feasible), (3) and matrix interference. The first two of these circumstances generally do not result in significantly elevated detection limits. However, matrix interferences sometimes cause significant elevations in the detection limits for a chemical contaminant, which leads to uncertainty as to whether that undetected compound could be present in significant concentrations at a site. Although some detection limits (SQL) were elevated above 2002 residential PRGs, detection limits for nondetected chemicals were typically sufficiently low to permit identification of potential health risks. However, detection limits were elevated for nondetected SVOCs in soil and groundwater and for VOCs, PCBs, and thallium in groundwater. These elevated detection limits are likely related to matrix interference from high concentrations of TPH in soil and groundwater. Further sampling and analysis of soil and groundwater may be needed to confirm that these chemicals are not present or to determine the extent of contamination.

Although soil and groundwater data gaps were identified, it was determined that the types and numbers of samples collected at Site 22 (see Figures 8-6A through 8-6L) and the analyses conducted were sufficient to characterize the site and to conduct risk assessments because data collection at the site focused mainly on potential sources and was conducted in phases. This phased approach afforded stakeholders opportunities to provide feedback on the suitability or adequacy of the collected data and the need to collect additional data to identify releases and complete the RI report. There is a low potential of any source at Site 22 not being adequately evaluated or of recommending NFA if it poses a potential risk to human health or the environment.

Both definitive and screening-level data were generated. Screening data were considered appropriate for use only in evaluations of nature and extent and fate and transport of chemicals. Section 3.4.2 provides further detail on the assessment of data quality and the use of definitive and screening-level data.

Data generated during the environmental investigations that were considered to be of sufficient quality for use in the RI report are presented in Appendix E and in the subsections below. Tables 8-13 and 8-14 summarize results of the CERCLA and EBS investigations for soil and groundwater. Soil gas results can be found in Appendix E. No data were collected at Site 22 under the TPH investigations. The summaries are organized according to analytical group and include the following: (1) the number and percent of detections of chemicals; (2) the average, minimum, and maximum detected concentrations; (3) minimum and maximum detection limits for nondetected samples; and (4) whether the maximum detected concentrations or detection limits exceed Region 9 residential PRGs or Cal-modified PRGs (EPA 2002a). Cal-modified

PRGs are used for some chemicals if the California EPA PRG is more protective than the federal EPA value. PRGs and MCLs are provided in the tables for comparison only.

8.3.2.1 Soil

Soil samples collected at Site 22 under the environmental investigations were analyzed for VOCs, SVOCs, PAHs, pesticides and PCBs, metals, and TPH as well as selected organic metals, pH, TOC, and percent moisture (see Table 8-13). Of the samples collected and analyzed, 64 samples for VOCs, 79 samples for SVOCs, 88 samples from the additional PAH sampling conducted in 2003, 63 samples for pesticides and PCBs, and 78 samples for metals were considered acceptable for use in this RI report. PAH data for soil samples collected during previous investigations were not evaluated because of the high detection limits associated with these data. Laboratory detection limits for some other chemicals exceeded residential PRGs (EPA 2002a); these exceedances are noted in Table 8-13. Detection limits for a few of the nondetected VOCs, SVOCs, pesticides and PCBs, and thallium in soil also exceeded residential PRGs (EPA 2002a); however, most of the nondetected samples had detection limits below PRGs except for the following SVOCs: 2-nitroaniline, hexachlorobenzene, and n-nitroso-di-n-propylamine, for which more than 50 percent of the detection limits exceeded PRGs in soil. These elevated detection limits are likely related to matrix interference from high concentrations of TPH. Detection limits for VOCs, SVOCs, pesticides and PCBs, and thallium were sufficiently low to permit identification of potential health risks.

A subset of these data was selected for use in the risk assessments (see table below). Data were considered to be appropriate for use if they (1) were validated, (2) could be used to characterize CERCLA releases, and (3) reflected current site conditions. Only data collected with the objective of characterizing CERCLA activities were used. Data collected as part of the EBS program are more of a screening nature, and inclusion of these data could add more uncertainty to the risk assessments. Risk from TPH was assessed separately (see Appendix F). Soil samples collected from petroleum-saturated soil were not included in the risk assessments. Petroleum-saturated soil was encountered in the area of the fuel island. Data for soils that are no longer present at Site 22 due to removal actions were not included because they do not reflect current conditions at the site.

Data for soil from each site were aggregated in depth intervals of 0 to 2, 0 to 4, and 0 to 8 feet bgs. The depth intervals evaluate potential exposures associated with site use. The 0-to-2-feet and 0-to-8-feet-bgs depth intervals evaluate potential human health exposures, and the 0-to-4-feet-bgs depth interval evaluates potential ecological exposures. The total number of samples for each analytical group included in the data set for each of these depth intervals is presented in the table below.

Number of Suitable Soil Data for Site 22 Risk Assessments			
Analytical Group	(0 to 2 feet bgs)	(0 to 4 feet bgs)	(0 to 8 feet bgs)
VOCs	6	20	37
SVOCs	15	30	49
PAHs	44	66	88
Pesticides and PCBs	9	19	34
Metals	15	29	50

The minimal data for VOCs in soil from 0 to 2 feet bgs is not perceived as a data gap because Site 22 is predominantly paved, and VOCs in surface soil would likely volatilize and no longer be present in soil at the site. Data for 2 to 8 feet bgs are sufficient to capture the nature and extent and risk from VOCs at Site 22.

Although nine soil samples collected between 0 to 2 feet bgs were analyzed for pesticides and PCBs, these data were not included in the risk assessments because they were nondetected. The lack of PCB and pesticide data was not perceived as a data gap because Site 22 is predominantly paved and pesticide and PCB use was not an activity identified at Site 22.

8.3.2.2 Groundwater

Groundwater samples collected at Site 22 were analyzed for VOCs, SVOCs, PAHs, pesticides and PCBs, and metals as well as physical parameters (hardness, acidity, pH, anions, specific conductance, total dissolved solids) dissolved gases, sulphides, biological and chemical oxygen demand (see Table 8-14). Of the samples collected and analyzed, 75 samples for VOCs, 29 samples for SVOCs, 7 samples for PAHs, 5 samples for pesticides and PCBs, and 52 samples for metals were considered acceptable for use in this RI report. Laboratory detection limits for some chemicals in groundwater exceeded tap water PRGs (EPA 2002a); these exceedances are shown in Table 8-14. Some VOCs, SVOCs, and PCBs that were nondetected or detected in groundwater at a low frequency had detection limits exceeding tap water PRGs and MCLs. Elevated detection limits are likely due to matrix interference from the high concentrations of TPH present in groundwater. PAHs and pesticides in groundwater had detection limits exceeding tap water PRGs (EPA 2002a); however, they were not significantly elevated and are likely due to the revision of PRGs over time and detection limits that are not always technologically feasible. Detection limits for nondetected thallium in groundwater were also elevated, and a few soil samples also had elevated detection limits for thallium.

A subset of the groundwater data was selected for use in the risk assessments (see table below). Data were considered to be appropriate for use if they (1) were validated, (2) could be used to characterize CERCLA releases, and (3) reflected current site conditions. Groundwater data for Site 13 were aggregated by contaminant plume rather than by site. Data for groundwater later replaced with more current data were not included because they do not reflect current conditions at Site 13. Only data collected under the IRP with the objective of characterizing CERCLA activities were used. Data collected as part of the EBS were not used to evaluate risk because they were collected with DQOs that differ from the CERCLA investigations. At least four

quarters of groundwater data from monitoring wells were used. However, if data were lacking for an analytical group, older data were included for all analytical groups. Groundwater data included samples collected from April 1994 to September 2002. Field and screening-level data typically were not used; however, data obtained using direct-push methods were used because of a lack of data from monitoring wells in the concentrated plume areas.

Groundwater samples collected from floating product areas were not included in the risk assessments. Floating product encountered in the center of Site 22 was associated with gasoline releases from the UST fuel island.

Number of Suitable Groundwater Data for Site 22		
Analytical Group	Suitable for RI	Used in Risk Assessments
VOCs	75	55
SVOCs	29	15
Pesticides and PCBs	5	0
PAHs	7	0
Metals	52	33

Five samples were analyzed for pesticides, three samples were analyzed for PCBs, and seven samples were analyzed for PAHs; however, data from these samples were not included in the risk assessments because all results were nondetected. The limited PCB and pesticide data was not perceived as a data gap because pesticide and PCB use was not an activity identified at Site 22.

8.3.2.3 Soil Gas

Data for soil gas were collected to evaluate indoor air risk in the HHRA. Four soil gas samples were collected at Site 22; two were collected at a depth of 1.5 feet bgs and two at a depth of 4 feet bgs. One sampling location is located in an area near the former USTs, and the other sampling location is southwest of the former fuel islands. Samples were analyzed for VOCs and SVOCs (see Appendix E). Detection limits for some of nondetected chemicals exceeded ambient air PRGs (EPA 2002a); however, SQLs were not set to meet these requirements.

8.3.3 Site 22 Background Comparison

A background comparison was conducted for Site 22 by comparing a background data set with analytical results for metals in samples representative of Site 22. This comparison was used to determine which metals in soil and groundwater are statistically similar to background and could be considered to be either naturally occurring (background) or potentially resulting from historical site activities. The complete approach is presented in Appendix A and summarized previously in Section 3.4.3.

Metals that exceeded background in soil included barium, beryllium, lead, manganese, selenium, vanadium, and zinc.

The statistical evaluation of lead in soil determined that lead exceeds background at Site 22. A review of the range of concentrations shows that lead concentrations at Site 22 are well above background concentrations (see Appendix A). Background concentrations ranged from 1.3 to 41 mg/kg, while site concentrations ranged from 2.1 to 9,890 mg/kg. Three soil samples (locations 547-6, 547-11 and MW-547-5) exhibited lead at concentrations of 160, 330, and 9,890 mg/kg, respectively. Samples from locations 547-6 and 547-11 were collected at a depth of 2 feet bgs from below the fuel islands. Soil from locations MW547-5 was collected at a depth between 0.5 and 1 foot bgs from an open area east of the paved refueling area. Based on these results, lead concentrations detected at Site 22 are considered above the range of background for Alameda Point.

Arsenic, iron, manganese, and thallium exceeded background in groundwater at Site 22.

The statistical evaluation for arsenic in Site 22 groundwater was only based on a comparison of detection frequencies using the test of proportions; that is, comparison of median concentrations was not possible because of the low detection frequency in the background data set, and comparison of the upper quantiles was not possible because the maximum concentration in both populations was a nondetect. Additional comparison of the two populations was conducted qualitatively using outlier box plots and quantile tables (see Appendix A). This comparison showed that the site median concentration (0.0064 mg/L) was only slightly higher than the background median concentration (0.0052 mg/L), but that the site population exhibited greater skewness (that is, a longer right-hand tail), resulting in higher concentrations for the upper quantiles of the site data set. Arsenic was detected four times at Site 22 at concentrations exceeding the maximum detected background concentration of 0.04 mg/L. The maximum detected concentration (0.086 mg/L) at the site was approximately two times the maximum detected background concentration. Except for four site concentrations that exceed the maximum detected background concentration, the site and background distributions are quite similar. There is no discernable pattern to the distribution of arsenic in groundwater at the site. The concentrations of arsenic detected at Site 22 are considered within the range of background for Alameda Point.

8.4 NATURE AND EXTENT OF CHEMICALS IN SOIL AND GROUNDWATER

This section summarizes the nature and extent of contamination in soil and groundwater at Site 22. The nature and extent evaluation summarizes (1) TPH detected at the site, (2) types and concentrations of CERCLA chemicals that most likely were used at the site, and (3) CERCLA chemicals that demonstrate significant risk to human health or the environment (also known as "risk drivers"). Only chemicals that pose risk to human health or the environment (see Appendices H and I) or relate to past site activity are discussed in the sections below. Section 8.4.2, Chemicals Used at Site 22, assisted the Navy in determining whether contamination "hot spots" were present at Site 22. The nature and extent of risk drivers, excluding those that may occur naturally at the site, are evaluated in Section 8.4.3. Risk drivers

are those chemicals that pose a cancer risk above 1E-06 or an HI above 1 to human receptors or pose significant risk to ecological receptors. The evaluation of risk drivers includes (1) site-specific figures to assess the spatial distribution and concentration patterns of risk drivers and (2) a review of the figures, data, and site hydrology to identify the boundaries of the contamination, the volume of the affected media, and, if possible, the suspected source of the risk drivers at the site.

8.4.1 TPH

Even though TPH is not a CERCLA contaminant, soil and groundwater were sampled at various locations across Site 22 for analysis of TTPH, which includes all TPH-fractions (TPH-d, TPH-g, TPH-jet fuel, or TPH-mo) and TPH-associated constituents (BTEX, lead, and MTBE) (see Figure 8-2).

An evaluation of TPH in soil and groundwater at Site 22 was conducted based on the TPH strategy for Alameda Point (see Appendix F) to assess contamination and possible risk at the site. On the basis of this evaluation, further action is not warranted for soil at Site 22. Further action is warranted for groundwater at Site 22. TPH in groundwater may be commingled with other CERCLA contaminants and should be further evaluated under the CERCLA program after floating petroleum product is removed from Site 22.

Because Site 22 was considered significantly impacted by TPH, corrective action for free TPH product in soil and groundwater is currently underway using a combination of DVE and biosparging. Pilot-scale operation of the DVE system began on June 21, 2004.

The following potential sources of TPH contamination were identified at Site 22:

- Storage of petroleum products – spills and leaks of petroleum products from the USTs and fuel lines were documented during operation of this facility until it was closed
- Fueling of automobiles
- Operation of a car wash – OWS 357 located near the car wash gathered runoff from its operation, including debris washed off of vehicles

Petroleum products and related compounds (BTEX and lead) were detected in soil at significant concentrations at Site 22 during several investigations. Generally the extent of these chemicals in soil is restricted to the immediate area around the fuel island. The nature and extent of petroleum-related compounds is addressed in the CAP for CAA-4C (Tetra Tech 2004) and is summarized below.

Soil

The maximum concentrations of TPH fractions and TPH-associated compounds detected during previous investigations were collected from 6 feet bgs in the area of the former fuel pump islands (see Figure 8-2). TPH-g was the main TPH fraction detected at concentrations of 10,200, 11,700, and 66,900 mg/kg at sampling locations B07C-12, B07C-13, and B07C-14 (see Table 8-11); these locations are 5 feet west of the fuel line that connected USTs 547-1 through 547-3 to the fuel pump islands, in the center of the fuel pump islands, and 30 feet south of the fuel pump islands.

BTEX was detected at concentrations ranging from 3.3 to 2,600 mg/kg in samples collected at 6 feet bgs from locations B07C-12, B07C-13, and B07C-14. TRPH was detected at a concentration of 10,800 mg/kg in a sample collected at 6 feet bgs from location B547-7, which is 15 feet north of the former fuel pump islands.

A soil source area was delineated in the area of the former fuel pump islands based on TTPH concentrations in soil or groundwater that exceeded the floating product screening levels (14,000 mg/kg for soil and 20 mg/L for groundwater) for floating product. The source area boundaries were drawn within close proximity (5 to 10 feet bgs) of sampling locations B07C-14, CAA4C-DGS-DP01 through CAA4C-DGS-DP06, and CAA4C-DGS-PZ01, where TTPH concentrations in soil or groundwater exceeded the floating product screening levels. The maximum concentrations of TPH fractions and TPH-associated compounds were detected in samples collected from 6 feet bgs at the soil-groundwater interface when the groundwater table is at its highest after the rainy season. Therefore, the depth of the soil source area near the former fuel pump islands was defined as 7 feet bgs (or 1 foot below the soil-groundwater interface).

Groundwater

Based on the elevated concentrations of TPH-g detected at 6 feet bgs in the area of the former fuel pump islands, groundwater samples were collected at sampling locations CAA4C-DG-DP01 through CAA4C-DGS-DP05 in April 2002 (see Figure 8-2 and Table 8-12). One sample was collected from each location at the soil-groundwater interface (between 7 and 12 feet bgs), and one samples was collected from each location at 5 feet below the soil-groundwater interface (or between 12 and 17 feet bgs).

In April 2002, samples of floating product were collected at sampling location CAA4C-DGS-PZ01. TTPH was detected above the floating product screening level (20 mg/L) at concentrations ranging from of 122.12 to 245.2 mg/L in samples collected between 7 and 10 feet bgs at locations CAA4C-DGS-DP01, CAA4C-DGS-DP04, and CAA4C-DGS-DP05; these locations are in the center of the former fuel pump islands and at 13 and 14 feet south of the former fuel pump islands. Benzene was also detected in all 10 Hydropunch samples collected between 7 and 17 feet bgs at concentrations ranging from 0.004 to 34 mg/L. Floating product of 1 mm thick was detected in shake tests conducted on soil samples collected at depths of 1.5, 3, 10, and 10.5 feet bgs and 2 mm thick on samples collected at 5 and 6 feet bgs from sampling location CAA4C-DGS-PZ01. However, floating product was not detected in the

piezometer with the oil-water interface probe, but an emulsion layer (with some small globules of floating product) was observed on the groundwater sample collected with the bailer from sampling location CAA4C-DGS-PZ01. The globules of floating product were not observed as a measurable layer after the groundwater sample was poured from the bailer into the volatile organic analysis vials. The top portion of the sample (the emulsion layer) was analyzed. The emulsion layer contained concentrations of TTPH and benzene (237 and 36 mg/L, respectively) that exceeded the floating product screening level.

In May 2002, a groundwater step-out investigation was conducted based on the results from the April 2002 event. Five additional Hydropunch® groundwater samples (locations CAA4C-DGS-DP06 through CAA4C-DGS-DP10) were collected at 4 feet bgs at 50-foot intervals from the locations where the Hydropunch samples were collected. TTPH was detected above the floating product screening level (20 mg/L) at a concentration of 108 mg/L at sampling location CAA4C-DGS-DP06, which is 10 feet northeast of the former fuel pump islands. A benzene groundwater plume was delineated with a surface area of about 40,807 square feet based on concentrations greater than 0.001 mg/L and according to data collected between July 2001 and May 2002.

8.4.2 Chemicals Used at Site 22

This section focuses on CERCLA chemicals detected in soil and groundwater that were used historically at Site 22. Chemicals that most likely were used at Site 22 and their breakdown products included petroleum fuels (TPH-d and TPH-g) and other chemicals associated with gasoline station operation or additives used in gasoline (for example, the anti-knock additive 1,2-DCA). Numerous releases of petroleum fuels directly from punctured USTs and fuel lines were reported to have occurred during the gas station's operation (IT 2001). These chemical concentrations and a general description of their extent are presented below by medium. Most of the chemicals detected across Site 22 are consistent with the historical activities known to occur at the site. Statistical summaries of all results for soil and groundwater are presented in Tables 8-13 and 8-14. Soil gas analytical results are presented in Appendix E.

Soil

Site 22 was a gasoline station, and there were no documented uses of CERCLA contaminants during the site's history. The table below identifies petroleum-related chemicals, the residential PRG (EPA 2002a), the range of concentrations detected in soil at the site, and the sampling locations where the maximum concentration of each chemical was detected. Figure 8-2 shows the sampling locations at Site 22. It also lists chemicals that were not detected in soil but were detected in groundwater at Site 22.

Soil Analytical Results for Chemicals Used at Site 22

Chemical	2002 Residential PRG (mg/kg)	Range of Concentrations (mg/kg)	Sampling Location of Maximum Concentration
2-Methylnaphthalene	NA	0.00026 to 220	C3S022B007
Benzene	0.6	0.006 to 3.8	547-1
Ethylbenzene	8.9	0.003 to 570	B07C-14
Lead	150	9,890 to 2.1	MW-547-5
Naphthalene	56	0.0027 to 110	B07C-14
Isopropylbenzene	160	Not Detected	Not Applicable
n-propylbenzene	240	Not Detected	Not Applicable
Toluene	520	0.002 to 840	B07C-14
Xylene (total)	270	0.002 to 2,600	B07C-14

Note: Residential PRG is provided for reference only. Risks are quantified in the HHRA section of this document.

* Denotes California-modified PRG

Petroleum fuels used at the site throughout its operation contained BTEX, specifically toluene and xylene. High concentrations of these chemicals were detected in soil samples collected across Site 22, but generally around and north of the fuel islands. Benzene was detected at concentrations exceeding the residential PRG in soil at four sampling locations, 547-1, 547-W3, B07C-12, and 547-12 (see Figure 8-2). All of these locations (except for B07C-12) are at or adjacent to the fuel delivery system at Site 22, and samples were collected from these locations during the removal and closure of the fuel lines. Benzene contamination at Site 22 is associated with petroleum use and is being addressed in the CAP (Tetra Tech 2004).

Lead detected in soil at Site 22 is likely associated with (1) the use of leaded gasoline at the fuel islands, (2) lead-based paint, and (3) background. Concentrations of lead in 50 of 53 samples collected at Site 22 are relatively consistent with background concentrations. However, three soil samples from locations 547-6, 547-11, and MW-547-5 exhibited lead at concentrations ranging from 330 to 9,890 mg/kg, which are above the Cal-modified PRG of 150 mg/kg (EPA 2002a). Soil from boring MW547-5 was collected near the surface in an open area east of the paved refueling area and may have contained lead-based paint. Sampling locations 547-6 and 547-11 are located below the fuel islands. Figure 8-2 shows the sampling locations at Site 22.

Naphthalene and 2-methylnaphthalene were detected across Site 22 in almost every PAH sampling location. Fossil fuels, such as petroleum and coal, naturally contain naphthalene compounds. It is assumed that the 2-methylnaphthalene and naphthalene detected at Site 22 are from petroleum hydrocarbons used at the site.

Groundwater

Site 22 was a gasoline station, and there were no documented uses of CERCLA contaminants during the site's history. The table below lists the chemicals that were most likely used at Site 13, the tap water PRGs (EPA 2002a), the range of concentrations detected in groundwater,

and the sampling location of the maximum detected concentration. Figure 8-2 shows the groundwater sampling locations at Site 22.

Groundwater Analytical Results for Chemicals Used at Site 22			
Chemical	2002 Tap Water PRG (mg/kg)	Range of Concentrations (mg/kg)	Sampling Location of Maximum Concentration
2-Methylnaphthalene	NA	1 to 60	MW547-3
Benzene	0.34	0.3 to 34	MW547-3
Ethylbenzene	1,300	0.7 to 7,100	CAA4C-DGS-PZ01
Naphthalene	0.093	15 to 380	W547-3
Isopropylbenzene	660	100 to 120	MW547-3
n-Propylbenzene	240	260 to 280	MW547-3
Toluene	720	0.3 to 34,000	CAA4C-DGS-DP01
Xylene (total)	210	1 to 36,000	CAA4C-DGS-PZ01

Note: PRG is provided for reference only. Risks are quantified in the Section 8.6 of this RI report.

High concentrations of BTEX were detected in groundwater samples collected across Site 22, but generally around and north of the fuel islands. Petroleum contamination at Site 22 is being addressed in the CAP (Tetra Tech 2004).

The presence of 2-methylnaphthalene, isopropylbenzene, naphthalene, and n-propylbenzene in groundwater is most likely related to the use of petroleum hydrocarbons. Isopropylbenzene and n-propylbenzene occur naturally in petroleum and bituminous coal and were detected only in groundwater samples collected from location MW547-3 during the last three quarters of 2002 to 2003 groundwater sampling. Naphthalene and 2-methylnaphthalene were detected across Site 22, with the highest concentrations detected in groundwater to the south of the fuel islands.

8.4.3 Risk Drivers

Although numerous chemicals were detected at Site 22, most of the chemicals do not pose significant risk as defined by the risk assessments. As a result, the purpose of this section is to further characterize the nature and extent of CERCLA chemicals driving risk at Site 22 that are not background. Selection of these chemicals was based on the background comparison for metals and the results of HHRA and ERA. Based on the HHRA, arsenic, BaP, benzene, ethylbenzene, and lead were identified as risk drivers in soil. Arsenic, 1,2-DCA, benzene, chloroform, ethylbenzene, manganese, naphthalene, PCE, thallium, TCE, and xylene were identified as risk drivers in groundwater. Based on the ERA, lead in soil was determined to pose a risk to terrestrial ecological receptors. Arsenic in soil and groundwater is attributed to background, so the nature and extent of this metal was not evaluated further.

8.4.3.1 Risk Drivers in Soil

This section discusses the nature and extent of BaP, benzene, ethylbenzene, xylene, and lead in soil.

BaP

Because BaP was identified as a potential risk driver in soil, the BaP equivalent was calculated for each sample collected at Site 22. Except for soil collected at two sampling locations (C3S022B009 and C3S022B019), BaP concentrations for each of the 52 samples were below the action level of 0.62 ((Navy 2001d). BaP equivalents for samples from locations C3S022B009 and C3S022B019, which are located in the eastern portion of Site 22, were 0.647 and 0.74 mg/kg, respectively. Figure 8-3 shows these sampling locations.

Benzene, Ethylbenzene, and Xylene

Petroleum fuels used throughout Site 22 contained BTEX. High concentrations of BTEX were detected in soil samples collected across the site, but the highest concentrations were generally around the fuel islands and fuel delivery system. BTEX contamination is associated with petroleum use at Site 22.

Lead

Concentrations of lead in 50 of 53 samples collected at Site 22 were relatively consistent with background concentrations. Samples collected from locations 547-6 and 547-11 (at 2 feet bgs) and MW-547-5 (between 0.5 and 1 foot bgs) exhibited lead concentrations of 160, 330, and 9,890 mg/kg, respectively. Sampling locations 547-6 and 547-11 are below the fuel islands. Sampling location MW547-5 is in an open area east of the paved refueling area. Samples collected from below the fuel islands are likely associated with the use of leaded gasoline. The sample collected from boring MW547-5 was collected near the surface and may have contained lead-based paint. No other soil samples were collected within 50 feet of this sample. Figure 8-2 shows these sampling locations.

8.4.3.2 Risk Drivers in Groundwater

This section discusses the nature and extent of 1,2-DCA, benzene, chloroform, ethylbenzene, manganese, naphthalene, PCE, thallium, TCE, and xylene in groundwater at Site 22.

Benzene, Ethylbenzene, and Xylene

Petroleum fuels used throughout Site 22 contained BTEX, and BTEX was detected in groundwater samples collected across the site. It is likely associated with petroleum use and is being addressed in the CAP (Tetra Tech 2004).

Chloroform

Chloroform was detected in one groundwater sample collected from monitoring well MW547-3 during quarterly groundwater sampling in 2003. It was not detected above the reporting limit during the three previous quarters and has not been detected in other soil or groundwater samples collected at Site 22. There is no history of use of chloroform at Site 22.

Naphthalene

Naphthalene was detected in groundwater at concentrations ranging from 380 to 15 µg/L. The maximum concentration was detected in groundwater south of the fuel islands (sampling location MW547-3). It is likely associated with the petroleum use and is being addressed in the CAP (Tetra Tech 2004).

TCE

TCE was detected in only 2 of 77 groundwater samples collected at Site 22. In 1997, TCE was detected at a concentration of 20 µg/L in a sample from monitoring well M07C-08, which is located along the eastern border of Site 22 next to a sanitary sewer line (see Figure 8-7). TCE has not been detected in seven groundwater samples collected from this well since 1997. In April 2003, TCE was also detected at a concentration of 1.9 µg/L in a sample from monitoring well MW547-3, which is the southwestern portion of Site 22 and downgradient from the high petroleum contamination. TCE was not detected in 10 other samples collected from this well since 1990. The detection limit for TCE was 1 µg/L in 51 of the 77 groundwater samples collected at Site 22. Because Site 22 contains TPH contamination, which causes matrix interference, the detection limits for several TCE samples were elevated. Achieving detection limits at or below the PRG for TCE is not technically achievable when analyzing for a full suite of VOCs, especially for environmental samples that include matrix interference.

TCE was commonly used at Alameda Point as a parts cleaner and paint stripper; however, there is no documented or anecdotal evidence of its use at Site 22. It is possible that it was used in small quantities for engine cleaning.

PCE

The presence of PCE at Site 22 is limited to a single detection (2.6 µg/L) from one monitoring well (MW547-3) in April 2003 out of 77 groundwater samples. PCE has not been detected in any other groundwater samples collected from this well since 1990. There has been no recent site activity at Site 22, and there is no reason to believe that PCE has recently been released at Site 22.

As with TCE, PCE was commonly used at Alameda Point as a parts cleaner and paint stripper; however, there is no documented or anecdotal evidence of its use at Site 22. It is possible that it was used in small quantities for engine cleaning.

1,2-DCA

The presence of 1,2-DCA at Site 22 is related to its use as a gasoline additive. 1,2-DCA was detected in 6 of 77 groundwater samples analyzed for VOCs at Site 22. Five of these samples were collected around the former fuel pump island, in the area of high petroleum contamination. One other sample was collected approximately 75 feet to the southwest (downgradient) from the fuel pump island. No other samples exhibited 1,2-DCA at Site 22.

Manganese

Elevated manganese concentrations may be attributed to reducing conditions associated with organic material present at Site 22, including petroleum hydrocarbons. There was no discernable pattern to the distribution of elevated manganese in groundwater. Manganese is not associated with site activity, but its relatively high concentrations in deeper groundwater at Site 22 are likely associated with the prevalence of reducing conditions at the site and possibly some contribution from saltwater intrusion. As discussed in Section 4.0, saltwater intrusion occurs at various locations of OU-2A, and Site 22 was near the historic shoreline of Alameda.

The statistical evaluation of manganese in groundwater determined that Site 22 manganese exceeds background (see Appendix A). A review of the range of concentrations shows that concentrations of manganese at Site 22 are greater than manganese in the background data set.

Thallium

Thallium has not been detected at Site 22 since 1995, and samples from 1998, 2001, 2002, and 2003 did not exhibit detectable concentrations of thallium. Elevated thallium concentrations detected in 1995 may be attributed to reducing conditions associated with organic material present at the site, including petroleum hydrocarbons. There was no discernable pattern to the distribution of elevated thallium in groundwater. Thallium is not associated with site activity and has not been detected since 1995.

The statistical evaluation of thallium in groundwater determined that Site 22 thallium exceeds background based on the frequency of detection (see Appendix A). Both the site and background data sets are characterized by very low detection frequencies in samples at the site (4 out of 51 measurements or 8 percent) and in background (3 out of 193 measurements or 2 percent). Additionally, the highest reported concentrations in both populations are nondetects. The only statistical evaluation possible for thallium was comparison of the relative detection frequencies. Additional comparison of the two populations using outlier box plots and quantile tables showed that the two distributions were comparable (see Appendix A).

8.5 FATE AND TRANSPORT

The objective of this evaluation is to determine whether the chemicals driving risk at Site 22 (1) have migrated or degraded, (2) are being released from a continuing source of contamination,

and (3) are likely to be distributed by groundwater or along other potential pathways. The chemicals driving risk in soil and groundwater at Site 22 include BaP, ethylbenzene, xylene, 1,2-DCA, benzene, PCE, manganese, naphthalene, TCE, and thallium.

No activities related to CERCLA have been documented during the history of Site 22. Petroleum contamination at Site 22 is related to operation of the gas station located in the center of the site. This contamination is being addressed under the CAP (Tetra Tech 2004).

8.5.1 BaP in Soil

PAHs, quantified as BaP equivalents, degrade extremely slowly in the environment and bind to organic matter in soil. In addition, they are mostly insoluble in water; therefore, they exhibit low potential for migration. The PAHs found at Site 22 likely will remain in their present state (ATSDR 1995a).

8.5.2 Benzene, Ethylbenzene, and Xylene in Soil

Benzene, ethylbenzene, and xylene contamination is associated with the gas station and petroleum use and is being addressed in the CAP (Tetra Tech 2004).

Volatilization is a major fate process that can affect benzene, ethylbenzene, and xylene concentrations in surface soils. In deeper soil, benzene is biodegraded under aerobic conditions (ATSDR 1997). Certain bacterial strains can completely degrade low levels of benzene; however, high benzene concentrations have a negative relationship on degradation rates. In anaerobic environments, mixtures of BTEX show a sequential utilization of hydrocarbons, with toluene the first to be degraded followed by xylene. Benzene and ethylbenzene tend to be degraded last (ATSDR 1997).

8.5.3 Lead in Soil

Lead is relatively immobile under most soil conditions because it sorbs to organic matter and forms complexes with inorganic clays. Only acidic conditions and low sulfate concentrations could increase the mobility of significant quantities of lead in groundwater (Lindsay 1979).

8.5.4 Benzene, Ethylbenzene, and Xylene in Groundwater

Benzene, ethylbenzene, and xylene were detected in groundwater samples collected across Site 22. BTEX contamination is associated with the gas station and petroleum use and is being addressed in the CAP (Tetra Tech 2004).

8.5.5 TCE and PCE in Groundwater

The source of the inconsistent detections of TCE and PCE in groundwater is unknown, and there is no evidence to indicate the existence of a plume at Site 22. Under anaerobic degradation conditions, PCE and TCE can transform into 1,2-DCE and vinyl chloride. Concentrations of 1,2-DCE and vinyl chloride were not detected in groundwater at Site 22.

8.5.6 Naphthalene in Groundwater

Naphthalene is likely associated with petroleum use because Site 22 was considered significantly impacted by TPH. It has relatively low mobility, and corrective action for TPH occurring at Site 22 should significantly reduce the remaining concentrations of naphthalene (Tetra Tech 2004). Residual naphthalene concentrations are expected to decrease further by natural degradation processes.

8.5.7 1,2-DCA in Groundwater

Common uses for 1,2-DCA include gasoline additive, solvents, pesticides, glues, varnishes, and strippers. There is no evidence to suggest the use or presence of solvents during the site's operation as a gas station; therefore, 1,2-DCA was most likely used as an additive in gasoline.

8.5.5 Manganese in Groundwater

The transport and partitioning of manganese in water is controlled by the solubility of the specific chemical form present, which is determined by pH, oxidation-reduction potential, and the characteristics of the available anions. Manganese (II) is the most soluble and most mobile form of manganese found in groundwater. Manganese (II) is predominant in most waters (pH 4 to 7) but may become oxidized at a pH greater than 8 or 9. The principal anion associated with manganese (II) in water is usually carbonate, and the concentration of manganese is limited by the relatively low solubility (65 mg/L) of manganese carbonate. In relatively oxidized water, the solubility of manganese (II) may also be controlled by manganese oxide equilibrium. In extremely reduced water, the fate of manganese tends to be controlled by formation of a poorly soluble sulfide.

Elevated manganese concentrations at Site 22 may be attributable to reducing conditions associated with organic material present in the BSU, petroleum products, and saltwater intrusion but is most likely associated with the prevalence of reducing conditions at the site.

8.5.7 Thallium in Groundwater

Thallium tends to sorb to aquifer materials and is more mobile under acidic conditions. In addition to typical ion-exchange reactions with soils at those pHs, thallium is also subject to microbially-mediated precipitation reactions with sulfide at neutral to alkaline pH and redox

potentials of -200 millivolts (Mueller 2001). Elevated thallium concentrations at Site 22 are most likely associated with the prevalence of reducing conditions at the site.

8.6 HHRA

A summary of the HHRA methodology is presented in Section 3.4.6. The summary includes details pertaining to selection of the data set, selection of COPCs, the exposure assessment, the toxicity assessment, and the risk characterization. Additional detailed information is provided in the HHRA (see Appendix H).

Soil and groundwater data representing saturated soils and groundwater with product sheen were collected and analyzed at Site 22. These data are problematic for risk assessments because they are not representative of site-wide baseline conditions but rather represent a hot spot of contamination. Several of these areas are being addressed under the Navy's TPH program, and a CAP has been submitted to RWQCB for approval (Tetra Tech 2003c). Some sites may be recommended for FSs to determine the best method for remediation; therefore, these hot spot data are not included in the HHRA. Risks and hazards presented below are based on fringe product concentrations.

Noncancer health hazards and carcinogenic risks calculated for Site 22 media are summarized in this section on a media-by-media basis, including surface soil, subsurface soil, soil gas and groundwater (vapor intrusion pathways), and groundwater (domestic use pathways). As noted in Section 3.4.6, the following receptors were evaluated in the HHRA: current/future commercial/industrial worker, future construction worker, future hypothetical resident, future construction worker intrusive exposure scenario (deep soil 0 to 8 feet bgs), and future hypothetical resident intrusive exposure scenario.

The total RME carcinogenic risks and noncancer HIs for Site 22 are summarized in Table 8-15. The total CTE carcinogenic risks and noncancer HIs for Site 22 are summarized in Table 8-16. Risk for each media and pathway is presented in these tables.

8.6.1 Risks from Soil

Commercial/industrial and construction worker scenarios are considered the most likely exposure scenarios. For soil, the highest total RME carcinogenic risk (including background) based on the industrial worker scenario is **7E-06**, which is within the risk management range. The total RME HI (including background) based on the construction worker scenario is **0.9**, which is less than an HI of 1. The RME risk results are summarized in Table 8-15 and detailed in Appendix H. The highest total CTE carcinogenic risk (including background) based on the industrial worker scenario is **2E-07**, which is less than the risk management range. The total CTE HI (including background) based on the construction worker scenario is **0.02**, which is less than an HI of 1. The CTE risk results are summarized in Table 8-16 and detailed in Appendix H.

The residential scenario is considered the most conservative estimate of risk. Soil data were aggregated in depth intervals of 0 to 2 feet bgs (surface soil) and 0 to 8 feet bgs (subsurface soil). For surface soil, the total RME carcinogenic risk (including background) based on the residential scenario is **6E-05**, which is within the risk management range. The total RME HI (including background) based on the residential scenario is **0.7**, which is below an HI of 1 (see Table 8-15). Arsenic and BaP were identified as carcinogenic risk drivers under the residential scenario. No noncancer risk drivers were identified in surface soil.

For surface soil, the total CTE carcinogenic cancer risk (including background) based on the residential scenario is **6E-06**, which is within the risk management range. The total CTE HI (including background) based on the residential scenario is **0.1**, which is less than an HI of 1 (see Table 8-16).

For subsurface soil (0 to 8 feet bgs), the total RME carcinogenic risk (including background) based on the residential scenario is **6E-05**, which is within the risk management range. The total RME HI (including background) based on the residential scenario is **3**, which exceeds an HI of 1. The following risk drivers were identified for subsurface soil at Site 22:

- Arsenic, BaP, benzene, and ethylbenzene for carcinogenic risk
- Xylene for noncancer health effects

For subsurface soil, the total CTE carcinogenic risk (including background) based on the residential scenario is **6E-06**, which is within the risk management range. The total CTE HI (including background) based on the residential scenario is **0.1**, which is below an HI of 1.

Based on a future resident or child that would be exposed to soil if the site were redeveloped for residential use, blood lead levels would be unacceptable (that is, there is a potential for unacceptable effects). However, the health effects associated with exposure to lead in soil at the site are unique. Because only a single reported sample exhibited lead at a concentration (9,980 mg/kg) exceeding the California-modified PRG of 150 mg/kg (EPA 2002a), the site-wide EPC is heavily skewed toward this outlier. The RME EPC is equal to 1,520 mg/kg for the site when the hot spot result of 9,980 mg/kg is included in the calculation. This maximum concentration of lead was detected at location MW547-5 and is considered a hot spot; risk managers may prefer to address this hot spot individually rather than including it in a site-wide EPC.

8.6.2 Risks from Groundwater

The groundwater pathway for construction worker receptors was not considered complete; therefore, groundwater was not evaluated for this scenario. Groundwater was evaluated for the commercial/industrial and residential scenarios.

Only inhalation of vapors from groundwater in indoor air was evaluated for the commercial/industrial scenario. The total RME carcinogenic risk (including background) based on the commercial/industrial scenario is **3E-06**, which is within the risk management range. The total RME HI (including background) based on the commercial/industrial scenario is **0.06**, which is less than an HI of 1. The total CTE carcinogenic risk (including background) based on the commercial/industrial scenario is **6E-08**, which is less than the risk management range. The total CTE HI (including background) based on the commercial/industrial scenario is **0.006**, which is less than an HI of 1.

The total RME carcinogenic risk (including background) based on the residential scenario is **3E-03**, which exceeds the risk management range. The total RME HI (including background) based on the residential scenario is **85**, which exceeds an HI of 1. The following carcinogenic and noncancer risk drivers were identified for groundwater at Site 22:

- 1,2-DCA
- Arsenic
- Benzene
- Chloroform
- Ethylbenzene
- Manganese
- Naphthalene
- PCE
- Thallium
- TCE
- Xylene

The total CTE carcinogenic risk (including background) based on the residential scenario is **4E-04**, which exceeds the risk management range. The total CTE HI (including background) based on the residential scenario is **29**, which exceeds an HI of 1.

Table 8-15 presents the specific RME risk attributed to each groundwater pathway. Groundwater risk from arsenic is attributable to background. Carcinogenic risk from exposure to ambient arsenic concentrations from ingestion of groundwater was 4E-04. Roughly one-half of the potential carcinogenic risk from ingestion of arsenic in groundwater (9E-04) is attributable to ambient concentrations. Nevertheless, the total carcinogenic risk not attributable to ambient arsenic concentrations is approximately 2E-03, which exceeds the risk management range of 1E-04 to 1E-06 for carcinogens.

8.6.3

HHRA Conclusions

Commercial/industrial and construction worker scenarios are considered the most likely exposure scenarios. The most conservative cancer risk for soil for these two scenarios is within the risk management range. The most conservative HI was less than 1 for soil. The pathway for exposure to inhalation of vapors from groundwater was complete for an industrial/commercial worker but incomplete for a construction worker. Risk from groundwater to commercial/industrial workers was within the risk management range.

The residential exposure scenario was also evaluated. HHRA results indicated carcinogenic risks from exposure to soil are at the high end of the risk management range and noncancer risks from soil are above an HI of 1. Lead in soil was determined to pose a potential risk. The HHRA indicated carcinogenic and noncancer risks from exposure to groundwater to be greater than the risk management range and above an HI of 1, respectively.

The tables below summarize HHRA results for carcinogenic and noncancer risks under the residential scenario. The tables also list the risk drivers and their relative contributions to carcinogenic risk and the noncancer HI for soil and groundwater exposures under the residential exposure RME scenario.

Site 22 Cancer Risk Residential Scenario Receptor: Potential Future Child		
Medium	Chemical Risk Drivers	RME Cancer Risk
Surface Soil	Arsenic ^a	6E-05
	BaP	1E-06
Groundwater (domestic use)	Arsenic ^a	9E-04
	TCE	9E-05
	PCE	2E-06
Groundwater Risk from Petroleum Products (domestic use and vapor intrusion)	Benzene	2E-03
	Ethylbenzene	4E-05
	1,2-DCA	1E-05
Subtotal Risk (risk drivers only ^b):		3E-03
Total Site Risk (all chemicals):		3E-03

Notes:

a Background, as discussed in Section 8.3.3 and Appendix A

b Risk drivers are chemicals that individually pose risk greater than 1E-06

**Site 22 Noncancer Risk Residential Scenario
Receptor: Potential Future Adult/Child**

Medium	Chemical Risk Drivers	RME Noncancer HI
Surface Soil	None	0.7
Groundwater	Arsenic ^a	9
	Manganese	30
	TCE	3
	Thallium	4
Groundwater Risk from Petroleum Products	Benzene	30
	Naphthalene	4
Subtotal Risk (risk drivers only^b):		81
Total Site Risk (all chemicals):		85

Notes:

a Background, as discussed in Section 8.3.3 and Appendix A

b Risk drivers are chemicals that individually have HI values greater than 1.0

HHRA results indicated that cancer risks from exposure to soil are within the risk management range and that noncancer risks from soil do not exceed an HI of 1; furthermore, risk in soil is attributable to background concentrations of arsenic and the presence of BaP and petroleum products. The carcinogenic and noncancer risk for groundwater exceed the risk management range.

8.7 ERA RESULTS

This section summarizes the results of the modified screening-level ERA conducted for Site 22 (see Appendix I). A modified screening-level ERA was conducted because Site 22 has limited habitat and because site-specific ecological sampling to support a baseline ERA is not feasible. This ERA is intended to be a conservative estimate, using more realistic exposure parameters for the ecological endpoints defined than would typically be used for a screening-level ERA.

The process used to conduct the modified ERA comprises the following components:

- Screening for COPEC
- Problem formulation
- Exposure estimates and risk evaluation
- Evaluation of assessment results

These components are summarized below.

8.7.1 Screening for COPECs

COPECs are organic and inorganic chemicals defined as potentially related to site activity and potentially causing adverse effects to ecological receptors. Evaluating site-specific data is the first step in quantifying risks and identifying potential hazards at each site. Data for the ERA were selected using the approach described previously in Section 3.4.7. Soil data for each site were aggregated at a depth interval of 0 to 4 feet bgs. Summaries of the soil data used for Site 22 are presented in Appendix I.

Groundwater at Site 22 was not assessed for two reasons: (1) groundwater does not discharge at the ground surface and (2) groundwater occurs at depths such that exposure to burrowing animals is expected to be minimal. For aquatic receptors, it is unlikely that contaminants in groundwater at Site 22 will reach surface water and affect ecological receptors because the site is more than 1,000 feet from the Bay and the Seaplane Lagoon. Therefore, an exposure pathway for aquatic receptors was not considered complete.

These data were used to develop COPECs for Site 22, which are presented in Table 8-17. Chemicals detected in soil were subjected to a screening process to focus the ERA on chemicals that are related to activities at the site and that pose the greatest potential risk to ecological receptors. The screening was a sequential process that considered factors such as frequency of detection, spatial distribution of detected chemicals, statistical comparison to background concentrations for inorganic chemicals, and chemical properties such as bioaccumulation and toxicity. The COPEC approach is described in further detail in Section 3.4.7 and Appendix I.

8.7.2 Problem Formulation

Problem formulation represents the stage of the ERA process where the goals, breadth, and focus of the assessment are determined. The major goal of the problem formulation component is to develop an ecological CSM.

Current and reasonable future uses of Site 22 were evaluated to determine the presence and potential future formation of habitat and to identify complete exposure pathways that might exist at the site. Currently, ecological habitat capable of supporting significant wildlife is not present at Site 22; however, exposure pathways for terrestrial receptors were considered complete to provide a conservative estimate of risk. Using a fully exposed soil scenario, the following complete exposure pathways for Site 22 were evaluated:

- Direct exposure to soil
- Food chain exposure

An exposure pathway for aquatic receptors was not considered complete because groundwater from Site 22 is not likely to reach the Bay (including the Seaplane Lagoon). Selected assessment and measurement endpoints for soil are presented in Section 3.4.7.

8.7.3 Exposure Estimates and Risk Evaluation

The exposure estimate and risk calculation step results in a conservative estimate of potential risk to the selected measurement endpoints. Using risk calculations, soil doses were then compared to TRVs or ERVs to evaluate potential risks to each ecological receptor, and an HQ (a ratio that is indicative of potential risks to ecological receptors) was derived. HQ results for soil at Site 22, using high and low TRVs, are presented in Table 8-18.

8.7.4 Evaluation of ERA Results

High and low TRVs were used to provide a bounding estimate of risk to each endpoint. The high TRV represents an upper bounding limit, which is the lowest concentration where adverse effects are known to occur. The low TRV represents the lower bounding limit, which is the highest concentration an endpoint can be exposed to where adverse effects are known not to occur. If both HQ values for a chemical in soil were below 1.0, then the chemical is not considered to pose a potential for risk to ecological receptors. Metals with one or both bounding limit HQs exceeding 1.0, were further compared to calculated background HQs for metals in soil (see Table 8-19). Chemicals with HQs above 1.0 and above background concentrations were further evaluated based on each chemical's frequency of detection and distribution at Site 22, the range of concentrations detected, and its absorption potential and toxicity to each ecological receptor. This type of analysis provides additional weight-of-evidence data to support risk management decisions for Site 22.

8.7.4.1 Risk to Small Mammals

All soil COPECs were evaluated at Site 22 for small mammal populations (California ground squirrel is the measurement endpoint). Published data were not adequate to develop an ERV for carbazole and ethylbenzene for small mammals; therefore, these chemicals were evaluated qualitatively. This section briefly discusses the evaluation of risk to small mammals from COPECs that exceeded HQs of 1.0, as well as those that were qualitatively evaluated.

COPECs with HQs above 1.0 included alpha- and gamma-chlordane, copper, lead, selenium, toluene, xylene, and zinc. Of those, the low TRV HQ values for only copper, lead, selenium, zinc, and toluene were above 1.0. These COPECs were further considered in a weight-of-evidence approach. After consideration of background concentrations at Alameda Point, the absorption potential of the chemical, the frequency of detection, and the concentrations detected at Site 22, copper, selenium, zinc, and xylene were determined to pose no significant potential for risk to small mammals, but the potential for risk from lead cannot be discounted.

The high TRV HQ values for alpha-chlordane and gamma-chlordane were 1.94 and 1.58, respectively. The low TRV HQ values for the two compounds were 3.88 and 3.17, respectively. These compounds are known to bioconcentrate and biomagnify in food chains. Physiologic and reproductive effects can be seen in wild mammals. Both alpha- and gamma-chlordane were detected in only 2 of 10 samples at maximum concentrations of 0.027 and 0.022 mg/kg, respectively; these concentrations were below the compounds' maximum laboratory reporting

limit of 0.87 mg/kg. Additionally, the high TRV HQ values are directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ value of 1,202.4. This value was calculated based on the K_{ow} value of 5.16. Potential impacts to small mammals from residual chlordane concentrations present at Site 22 cannot be discounted, but are expected to be low.

The qualitative evaluation of risk to small mammals from exposure to carbazole and ethylbenzene involved assessing the weight-of-evidence parameters discussed above. Based on the low detection of frequency, the relatively low concentrations detected at Site 22, and the knowledge that VOCs generally will cause toxic effects only at higher doses, impact to small mammals from these chemicals is expected to be low.

8.7.4.2 Risk to Passerines

All soil COPECs were evaluated at Site 22 for passerine populations (Alameda song sparrow and the American robin are the measurement endpoints). Published data were not adequate to develop avian ERVs for HMW and LMW PAHs, carbazole, 4-methyl-2-pentanone, benzene, ethylbenzene, toluene, and xylene. This section briefly discusses the evaluation of risk to passerines from the COPECs with HQs above 1.0 as well as those that were qualitatively evaluated.

COPECs with HQs above 1.0 included lead and alpha- and gamma-chlordane. HQs for the Alameda song sparrow and the American robin using the high TRV for lead were below 1.0. The HQs for the song sparrow and the robin using the low TRV for lead were 640 and 2,140, respectively; these concentrations exceeded the background HQs of 2.71 and 9.07. However, the HQs may be driven by the overly conservative low TRV. Using the allometrically converted TRVs for the passerines, the HQs using the low TRV for lead at Site 22 were 1.77, for the song sparrow, and 5.90, for the robin. Based on this information, lead at Site 22 poses a potential risk to passerines.

The low HQ values for alpha-chlordane and gamma-chlordane were 2.75 and 2.24, respectively, for the song sparrow, and 8.52 and 6.94, respectively, for the robin. These compounds are known to bioconcentration and biomagnify in food chains. Physiologic and reproductive effects can be seen in wild birds. Both alpha- and gamma-chlordane were detected in only 2 of 10 samples at maximum concentrations of 0.027 and 0.022 mg/kg, respectively; these concentrations were below the compounds' maximum laboratory reporting limit of 0.87 mg/kg. Additionally, the high HQ values are directly attributable to the conservative $BCF_{\text{soil-to-invertebrate}}$ value of 1,202.4. This value was calculated based on the K_{ow} value of 5.16. Potential impacts to passerines from residual chlordane concentrations present at Site 22 cannot be discounted, but are expected to be low.

The qualitative evaluation of risk to passerines from exposure to HMW and LMW PAHs, carbazole, 4-methyl-2-pentanone, and BTEX involved assessing the weight-of-evidence parameters discussed above. Studies indicated that PAH chemicals do not appear to bioaccumulate in mammals and birds (Eisler 1987a). Additionally, based on the relatively low frequency of detection and low concentration of PAHs and the SVOC, carbazole risk posed to

passerines from these ecological COPECs is expected to be low. Only residual levels of VOCs are present in soils at Site 22. Mammals and birds generally metabolize VOCs quickly; therefore, the risk posed to passerines from such residual levels of VOCs is expected to be low.

8.7.4.3 Risk to Raptors

All soil COPECs were evaluated at Site 22 for raptor populations (red-tailed hawk is the measurement endpoint). Published data were not adequate to develop avian ERVs for HMW and LMW PAHs, carbazole, 4-methyl-2-pentanone, benzene, toluene, and xylene. All other COPECs evaluated at Site 22 were determined to pose no significant risk based on an HQ less than 1.0, using both the low and high TRVs. This section briefly discusses the evaluation of risk to raptors from COPECs with HQs above 1.0 as well as those that were qualitatively evaluated.

COPECs with HQs above 1.0 included lead. The high TRV HQ for lead was below 1.0, while the low TRV HQ for lead was 1,260. However, this HQ may be driven by the overly conservative low TRV. Using the allometrically converted TRV for raptors, the HQ using the low TRV for lead at Site 22 was 3.46, while the background HQ was 0.0603. Based on this information, lead at Site 22 poses a potential for risk to raptors.

The qualitative evaluation of risk to raptors from exposure to HMW and LMW PAHs, carbazole, 4-methyl-2-pentanone, and BTEX involved assessing the weight-of-evidence parameters. Studies indicated that PAH chemicals do not appear to bioaccumulate in mammals and birds (Eisler 1987a). Additionally, based on the relatively low frequency of detection and low concentration of PAHs and the SVOC carbazole, risk posed to raptors from these COPECs is expected to be low. Only residual levels of VOCs are present in soils at Site 22. Mammals and birds generally metabolize VOCs quickly; therefore, the risk posed to raptors from such residual levels of VOCs is expected to be low.

8.7.5 Uncertainty

The screening-level ERA process involves a large number of uncertainties and extrapolations to evaluate potential risk to ecological receptors. Many of the assumptions in the screening-level ERA process are conservative and result in overestimated site-specific parameters. Uncertainties associated with the ERA are identified in Section 3.4.7.5.

8.7.6 ERA Conclusions

Results of the HQ calculations and qualitative evaluations indicate potential risk to small mammals, passerines, and raptors from lead. However, based on the lack of habitat at Site 22 and the planned future use of the site, any risk associated with exposure to lead will be low.

8.8

CONCLUSIONS AND RECOMMENDATIONS

The conclusions of the evaluations conducted in support of the CERCLA risk management process are presented in Sections 8.8.1 (nature and extent) and 5.8.2 (risk assessments), and the overall recommendations for Site 22 are presented in Section 8.8.3.

8.8.1 Nature and Extent Conclusions

The nature and extent evaluation concluded that most of the chemicals detected across Site 22 are consistent with the historical activities known to occur at the site, which included a gasoline station and car wash. Physical features of Site 22, along with specific details on the waste generated and past disposal and storage practices associated with these wastes, were used to identify potential sources of CERCLA chemicals. Site 22 was a gasoline station and there were no documented uses of CERCLA contaminants during the site's history. However environmental investigations were conducted at the site to identify and assess the extent of CERCLA chemicals in soil and groundwater. Of the potential sources the following physical features and site activities were considered likely sources at Site 22:

- Former gas station and associated USTs 547-1 through 547-3 and fuel lines
- OWS 547 associated with the car wash
- Fill material containing PAHs

Because Site 22 was considered significantly impacted by TPH, corrective action for free TPH product in soil and groundwater is currently underway using a combination of dual vapor extraction. Petroleum products associated with the former gasoline station are believed to be the source of contaminants in soil and groundwater. Most of the maximum detected concentrations of the chemicals (BTEX, lead, naphthalene, 2-methylnaphthalene, isopropylbenzene, n-propylbenzene) related to petroleum fuels used at Site 22 were located near the fuel islands or fuel lines.

BTEX, naphthalene, and 2-methylnaphthalene were detected in soil samples collected across Site 22, and the highest concentrations of BTEX were generally located around the fuel islands and fuel delivery system. BTEX was detected in groundwater samples collected across Site 22, but the highest concentrations were generally around and north of the fuel islands.

Lead detected in soil at Site 22 is likely associated with the use of leaded gasoline at the fuel islands, lead-based paint, and background. Concentrations of lead in 50 of 53 samples collected at Site 22 are relatively consistent with background concentrations. Three soil samples collected at depths between 0.5 and 2 feet bgs exhibited lead ranging in concentrations from 160 to 9,890 mg/kg. Two of the samples were collected from locations below the fuel islands and are likely associated with the use of leaded gasoline. The maximum concentration of lead was detected in soil collected from an open area east of the paved refueling area; this sample was

collected near the surface and may have contained lead-based paint. No other soil samples were collected within 50 feet of this sample.

Isopropylbenzene, n-propylbenzene, naphthalene, and 2-methylnaphthalene were detected in groundwater across Site 22. Isopropylbenzene and n-propylbenzene occur naturally in petroleum and were only detected in groundwater samples collected from one well during the last three quarters of 2002 to 2003 groundwater sampling. Naphthalene and 2-methylnaphthalene were detected across the site with the highest concentrations detected in groundwater to the south of the fuel islands.

In addition, VOCs (TCE, PCE, and 1,2-DCA) were detected in a few groundwater samples. TCE was detected in 2 of 77 groundwater samples, and PCE was detected in 1 of 77 groundwater samples. TCE was detected in a well along the eastern border of Site 22 next to a sanitary sewer line at a concentration of 20 µg/L in 1997 and has not been detected in the seven groundwater samples collected from this well since 1997. TCE along with PCE was also detected in a monitoring well located in the southwestern portion of Site 22 downgradient from the high concentrations of petroleum. TCE and PCE were detected at concentrations of 1.9 and 2.6 µg/L in April 2003. TCE and PCE were not detected in other samples collected from this well since 1990. TCE and PCE were commonly used at Alameda Point as a part cleaner and paint stripper; however, there is no documented or anecdotal evidence of their use at Site 22. It is possible that solvents containing PCE and TCE were used in small quantities for engine cleaning.

The presence of 1,2-DCA at Site 22 is related to its use as a gasoline additive. 1,2-DCA was detected in 6 of 77 groundwater samples. Five of these samples were collected around the former fuel island. One other sample was collected approximately 75 feet to the southwest (downgradient) from the fuel island.

Although numerous chemicals were detected at Site 22, some of these chemicals do not pose significant risk as defined by the risk assessments. Significant risk to human health is potentially posed by arsenic, BaP, benzene, ethylbenzene, lead, and xylene in soil and by arsenic, 1,2-DCA, benzene, chloroform, ethylbenzene, manganese, naphthalene, PCE, thallium, TCE, and xylene in groundwater. Lead was determined to pose a risk to terrestrial ecological receptors. Arsenic in soil and groundwater is attributed to background concentrations.

BaP in soil exceeded the action level of 0.62 mg/kg at only two sampling locations in the eastern portion of Site 22 (C3S022B009 and C3S022B019); concentrations in soil from the remaining 52 samples were below the action level. The BaP equivalents for soil from locations C3S022B009 and C3S022B019 (0.647 and 0.74 mg/kg) are within the Alameda Point risk management range of 0.62 to 1.0 mg/kg.

Chloroform was only detected in one groundwater sample collected from a quarterly groundwater monitoring well in 2003. It was not detected above the reporting limit during the three previous quarters and has not been detected in other soil or groundwater.

The background comparison determined that manganese and thallium in groundwater at Site 22 are not attributed to background. A review of the range of concentrations shows that concentrations of manganese at Site 22 are greater than manganese in the background data set. There was no discernable pattern to the distribution of elevated manganese in groundwater, and manganese is not associated with site activities. Elevated manganese concentrations may be attributed to reducing conditions associated with organic material present at the site, including petroleum hydrocarbons.

Thallium exceeds background based on the frequency of detection. Both the site and background data sets are characterized by very low detection frequencies. The only statistical evaluation possible for thallium was comparison of the relative detection frequencies. Additional comparison of the two populations using outlier box plots and quantile tables showed that the two distributions were comparable. There is no discernable pattern to the distribution of thallium in groundwater, and thallium is not associated with site activities and has not been detected since 1995. Thallium concentrations may be attributed to reducing conditions associated with organic material present at the site, including petroleum hydrocarbons.

Data gaps for soil and groundwater were identified. Detection limits were elevated for nondetected SVOCs in soil and groundwater and for VOCs, PCBs, and thallium in groundwater. These elevated detection limits are likely related to matrix interference from high concentrations of TPH in soil and groundwater. Further sampling and analysis of soil and groundwater was recommended to confirm that these chemicals are not present or to determine the extent of contamination. In addition, sufficient sampling has not been conducted near OWS 547, which is associated with the car wash, to determine whether soil or groundwater contamination occurred during operation of the car wash.

Although these data gaps were identified, it was determined that the types and numbers of samples collected at Site 22 and the analytical suite were adequate to characterize the site and conduct risk assessments because data collection at the site focused mainly on potential sources and was conducted in phases. This phased approach afforded stakeholders opportunities to provide feedback on the suitability or adequacy of the data collected and the need for additional data to identify releases and complete the RI report. There is a low potential that NFA would be recommended if Site 22 poses a potential risk to human health or the environment.

8.8.2 Risk Assessment Conclusions

An HHRA and modified screening-level ERA were conducted to evaluate risk from chemicals detected at Site 22. The sections below present the conclusions for the HHRA and ERA, respectively.

8.8.2.1 HHRA Conclusions

According to reuse plans for Alameda Point (EDAW 1996), commercial/industrial and construction worker exposures are the most likely future exposures at Site 22. Human health risk

was evaluated for commercial/industrial and construction worker exposures, along with residential exposures. The residential exposure scenario was evaluated to allow for flexibility in implementing the reuse plan (or modifications thereto) at Alameda Point and because EPA risk assessment guidance (EPA 1989) includes a strong preference for evaluation of the residential pathway.

For the commercial/industrial and construction worker scenarios, the most conservative carcinogenic risks for soil and groundwater are within the risk management range. The most conservative HIs were less than 1 for soil and groundwater.

The tables in Section 8.6.3 summarized the HHRA results for carcinogenic and noncancer risks under the residential scenario. Those tables also list risk drivers and their relative contributions to carcinogenic risk and the noncancer HI for exposure to soil and groundwater under the RME residential exposure scenario. For the residential scenario, the HHRA indicated that carcinogenic risk from exposure to soil is within the risk management range and that noncancer risk from soil is less than 1; furthermore, risk from soil is attributable to benzene, ethylbenzene, PAHs associated with petroleum products, lead, and background concentrations of arsenic. The carcinogenic and noncancer risks for groundwater exceed the risk management range and are attributable to the following:

- 1,2-DCA
- Arsenic
- Benzene
- Ethylbenzene
- Manganese
- Thallium
- TCE
- PCE

Site 22 groundwater risk is largely attributed to exposure to petroleum-related compounds through vapor intrusion and domestic use of groundwater. A petroleum removal action is ongoing at Site 22 to address these concerns. Carcinogenic risk from CERCLA chemicals in groundwater at Site 22 (TCE and PCE) is attributed to spurious detections within the petroleum plume.

Lead was selected as a COPC in soil at Site 22. The maximum concentration of lead detected in surface soil at Site 22 was 9,980 mg/kg, which is greater than the Cal-modified residential PRG for lead of 150 mg/kg (EPA 2002a). This exceedance suggests that a receptor would have unacceptable blood lead levels due to exposure to soils. However, the health effects associated with exposure to lead are unique in nature. Because only a single reported sample contained lead at a concentration exceeding the Cal-modified PRG, the site-wide EPC is heavily skewed toward this outlier. Because of the skewed data, this concentration of lead should be considered a hot spot rather than a site-wide exposure.

8.8.2.2 ERA Conclusions

A site-specific ERA was conducted for Site 22 to estimate potential risks to the environment. Currently, ecological habitat capable of supporting significant wildlife is not present at Site 22; therefore, exposure pathways for terrestrial receptors were considered potentially complete to provide a conservative estimate of risk. Risk to marine receptors was not evaluated because exposure pathways for aquatic receptors were considered incomplete. Assessment endpoints include small mammals, passerines, raptors, and marine receptors.

Results of the HQ calculations and qualitative evaluations indicate potential risk to small mammals, passerines, and raptors from lead. However, based on the lack of habitat at Site 13 and the planned future use of the site, no risks to ecological receptors have been identified that require further evaluation or mitigation.

8.8.3 Recommendations

Based on the data and risks discussed previously, soil and groundwater at Site 22 are recommended for further evaluation in an FS, as defined under CERCLA, to address risks to residential receptors under the unrestricted reuse scenario. Total site risk to residential receptors (including background) is above the risk management range. COCs identified for soil are BaP, benzene, ethylbenzene, lead, and xylene. Arsenic in soil was identified as a risk driver but is attributed to background. Lead should be considered a hot spot rather than a site-wide exposure. COCs identified for groundwater are 1,2-DCA, benzene, chloroform, ethylbenzene, manganese, naphthalene, PCE, thallium, TCE, and xylene. Although antimony and arsenic were identified as risk drivers, they are attributed to background.

An evaluation of TPH in soil and groundwater also was conducted based on the TPH strategy for Alameda Point (Navy 2001a) (see Appendix F). Based on this evaluation, further action is not warranted for soil at Site 22. Further action is warranted for groundwater at Site 22. However, because Site 22 was considered significantly impacted by TPH, corrective action for free TPH product in soil and groundwater is currently underway using a combination of dual vapor extraction and bioparging.

Recommendations for further action under CERCLA will be based only on CERCLA contaminants; TPH-related chemicals are being addressed under a CAP.